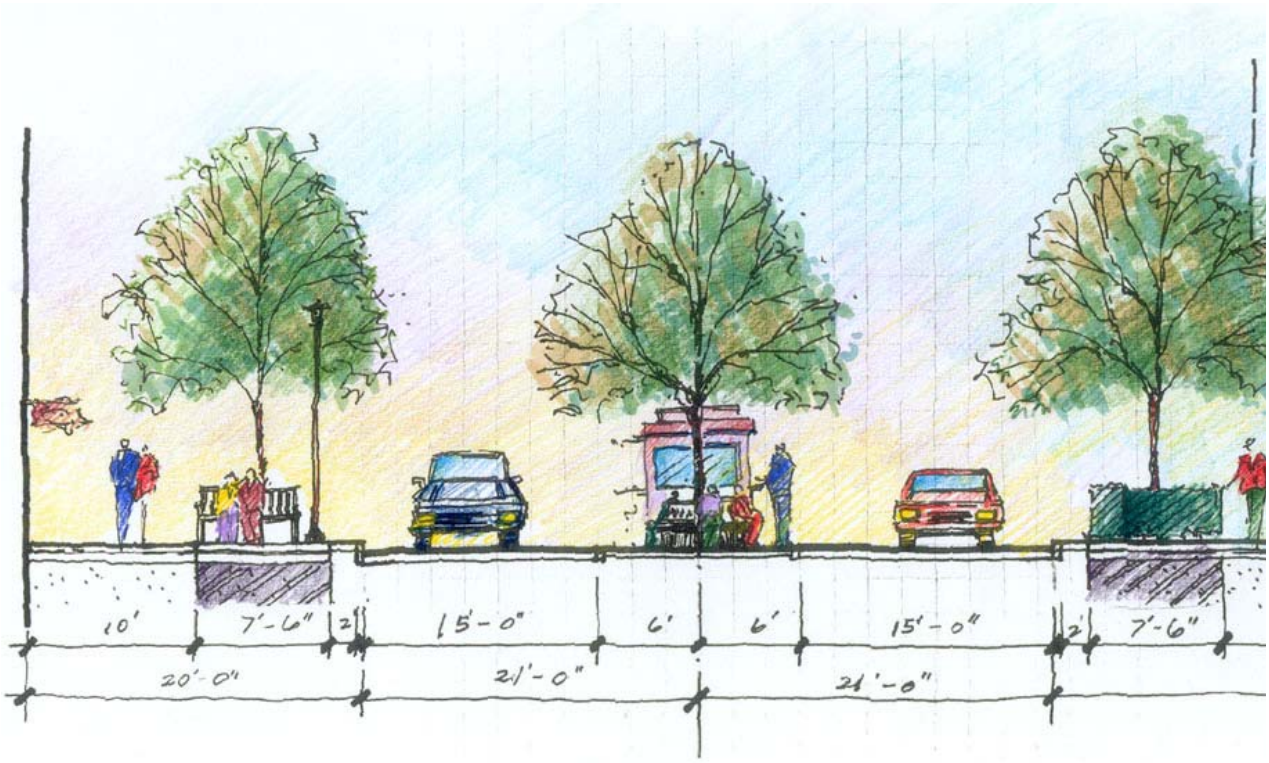
The McLean Streetscape Project



The McLean Revitalization Corporation

Fairfax County Department of Public Works and Environmental Services

Lewis • Scully • Gionet • Inc.

Burgess & Niple, Limited

Bellomo-McGee Inc.

McLean Streetscape Project
Chain Bridge Road Enhancements

Preliminary Design Report

McLean Revitalization Corporation

Fairfax County Department of Public Works and Environmental Services

March 14, 2001

Lewis • Scully • Gionet • Inc.

Bellomo-McGee, Inc.

Burgess & Niple Limited

Table of Contents

1. Executive Summary

1.1. Study Scope

The vision for future McLean streetscapes is described in the *Open Space Design Standards*, developed by the McLean Planning Committee (MPC), in a series of public meetings starting in 1997 and made a part of the Comprehensive Plan in 1998. The Revitalization efforts for the McLean Community Business Center (CBC), designated a Special Study Area by the Board of Supervisors, are also supported by the *McLean CBC Special Study* document which has been adopted as part of the Sector Plan text.

The *Study* and *Design Standards* recommend specific improvements throughout McLean. To further test the viability of these concepts, estimate their costs and recommend an approach to implementation, the McLean Revitalization Corporation (MRC) secured grant funding. With the assistance of the Fairfax County Department of Public Works and Environmental Services, MRC commissioned a planning team headed by Lewis • Scully • Gionet • Inc. (LSG) to complete a preliminary streetscape study of Chain Bridge Road, from its intersection with Westmoreland Street to the intersection with Old Chain Bridge Road, a distance of approximately 4,175 feet.

This study focused on improving the pedestrian environment of McLean through traffic calming; the installation of streetscape improvements such as street trees, sidewalks and street furnishings; and the creation of special improvements in key areas. These special improvements include the creation of a “Main Street,” or walkable pedestrian precinct, and a proposed roundabout at the intersection of Old Dominion Drive and Chain Bridge Road.

1.2. Existing Conditions

The team’s evaluation of existing streetscape conditions within the project area identified particular issues that will influence how streetscape improvements and the development of the special areas occur. In general, these observations confirm findings of the CBC Special Study:

- narrow rights-of-way - existing right-of-way of the VDOT maintained street are narrow, limiting streetscape development;
- few street trees – while the McLean Trees Committee has been successful in planting trees throughout the project area, narrow rights-of-way and multiple curb cut locations have resulted in limited area for plantings;
- overhead utilities – overhead utilities, while largely consolidated to one side of Chain Bridge Road, are highly visible because their alignment shifts sides in multiple locations;
- uncoordinated lighting – lighting located within the CBC is of mixed type, vintage and location, and does not contribute to urban design themes expressed in the *Open Space Design Standards;*
- no street furnishings – the streetscape lacks adequate benches or other amenities for pedestrians and shoppers.

The team also conducted a detailed analysis of traffic patterns, and discovered the following:

- signal optimization – all intersections along Chain Bridge Road are currently coordinated, and traffic signal timings have been optimized;
- level of service at key intersections – current levels of service (LOS) at Chain Bridge Road and Old Dominion Drive, the location of the proposed roundabout, are D during the AM and the PM peak periods and C during the weekend peak period. LOS at the intersection with Laughlin Road, the location of the proposed "Main Street" is A under the same three time frames;
- traffic safety – accident data indicate the greatest number of accidents are property damage types, common at signalized intersections. Based on the amount of traffic it carries, the major intersection at Old Dominion Drive does not experience an extraordinary number of accidents;
- pedestrian activity – pedestrian activity on the corridor, including the intersection with Old Dominion Drive, is minimal, with only one reported pedestrian accident in the last five years.

1.3. Streetscape Recommendations

Based on this evaluation of existing conditions, the planning team believes that full installation of the *Open Space Design Standards* will do much to improve the character of McLean and quality of resident and visitor experience in the CBC. The team recommends that MRC continue with the implementation of these elements, subject to some modifications and enhancements:

Hardscape:

- textured flush median – install a textured flush median the length of Chain Bridge Road to separate traffic in opposing directions, while allowing for left turn movements;
- paver designated crosswalks – install paver crosswalks at all key pedestrian crossing points;
- paver sidewalks – designate and install a standard paver sidewalk system.

Landscape:

- street tree plantings – install a regular planting of street trees on Old Chain Bridge Road, selecting them from species currently most represented, to provide unified and consistent appearance;
- other plantings – use groundcovers and perennials to provide seasonal interest and to assist in screening adjacent parking lots;
- special areas – the roundabout and Main Street areas, if developed, should receive a special level of detail and care in plantings and maintenance, and should be considered as possible locations for public art;
- irrigation – streetscape plantings should be irrigated.

Utilities:

- lighting – designate and install a local standard light fixture for use in all areas of the CBC, including public streets;
- overhead utilities - consolidated overhead utilities so that only overhead primary power remains, with all communications facilities located underground and all perpendicular overhead crossings eliminated.

Traffic Calming and Special Areas

Recommendations for traffic calming and the development of special areas are complicated by the volume of traffic carried by Chain Bridge Road, particularly at its intersection with Old Dominion Drive.

- Traffic Calming – install flush medians for potential calming effect. No currently available traffic calming techniques, other than medians, are considered feasible for use on Chain Bridge Road;
- Commercial Entrance Consolidation – consolidate entrances to maximize safety and aesthetic benefits. Approximately 16 entrances could be removed to improve traffic flow;
- Main Street – align the proposed Main Street with Laughlin Avenue at a four-leg intersection with Chain Bridge Road;
- Roundabout – if supported by the community, construct a roundabout at the proposed location. As envisioned, a roundabout meeting current FHWA guidelines can be installed with limited disruption to some adjacent properties. This roundabout would improve intersection operations in all but one time period studied, and will enhance safety by minimizing conflict points and lowering the absolute speed of drivers approaching and driving around the roundabout.

1.4. Implementation

Implementation should proceed by initially moving to the construction of a portion of the Chain Bridge Road study area as a demonstration project. Concurrently, the MRC should work to include streetscape elements in local development projects, and to move the balance of the Chain Bridge Road project area through further design and engineering, approvals, procurement of funding and construction.

The demonstration project will allow a limited palette of elements to be installed. Business district users will be able to experience how the completed installation will function. Selection of a demonstration area should be based on its central location; limited constructibility challenges, such as the need to relocate overhead utilities; limited need for additional rights-of-way or easements; ability to display a wide range of streetscape

elements; and the potential to match public investment with completed or planned private improvements. Four areas potentially meet some or all of these criteria:

- Laughlin Avenue, South side of Chain Bridge Road;
- Old Fire Station, North side of Chain Bridge Road;
- Giant Supermarket Frontage, North side of Chain Bridge Road;
- Curran Street to Langley Shopping Center, North side of Chain Bridge Road.

Full implementation of streetscape improvements within the CBC will require the successful conclusion of a number of policy initiatives, including review and acceptance of round about, acceptance of non-Dominion Virginia Power lighting fixtures, and the negotiation of private sector contributions of right-of-way. Full implementation will also require significant capital expenditures, should the majority of improvements not be constructed as part of development initiated proposals for the Chain Bridge Road corridor.

Based on current capital estimates, construction of the Chain Bridge Road streetscape, excluding Emerson Avenue to Corner Lane (the area of the roundabout) will cost approximately $4.4 million. The roundabout area is anticipated to cost approximately $2.0 million. Eliminating the roundabout minimizes the amount of construction necessary on Old Dominion Drive, and would thus reduce overall project cost from $6.4 million to approximately $4.9 million.

2. Introduction

2.1. Prior Studies and Recommendations

McLean CBC Special Study

In 1997, the 230 acre McLean Community Business Center was designated a Special Study Area by the Board of Supervisors. This was followed by a highly participatory planning effort, organized to identify a community vision for McLean. From this effort, the McLean Planning Committee incorporated the basic elements of this vision into plan amendment text and the *Open Space Design Standards*. A Comprehensive Plan Amendment, including, these standards, was adopted April 27, 1998. The McLean Revitalization Corporation was then able to secure TEA-21 grant funding for preliminary engineering and design of traffic calming and streetscape improvements.

Open Space Design Standards

The design standards include both urban design components, meant to shape the form of future development on commercial sites within the CBC, and streetscape standards to be implemented on all streets. These, and the other parts of *McLean CBC Special Study* document served as the basis for this work on Chain Bridge Road. The McLean Planning Committee has continued to review and evaluate those standards, suggesting additional clarifications or enhancement as developers begin to incorporate them into planned projects within McLean. To the extent possible the preliminary engineering described herein and on the accompanying plans incorporates both the original guidelines and recently suggested modifications.

Special Interest Areas

The McLean CBC Special Study identified a number of key locations for special improvements, most requiring extensive public-private cooperation. Two of these occur within the project area. The first of these is the creation of a “Main Street,” walkable pedestrian precinct constructed by realigning Laughlin Avenue and extending it to the northwest, across Chain Bridge Road. The second is the creation of a proposed roundabout at the intersection of Old Dominion Drive and Chain Bridge Road.

2.2. Evaluating the Recommendations

Project Scope

In the Summer of 2000, Lewis • Scully • Gionet • Inc. (LSG) was selected by the McLean Revitalization Corporation and Fairfax County's Department of Public Works and Environmental Services to complete a preliminary streetscape study of Chain Bridge Road, from its intersection with Westmoreland Street to the intersection with Old Chain Bridge Road. Other team members included traffic and transportation engineers and planners Bellomo McGee Inc. (BMI) and surveyors and civil engineers Burgess & Niple (B&N). The basic scope of this study is to illustrate how the proposed streetscape fits within a sample portion of the CBC, and to determine whether certain complex elements of the plan, such as the roundabout or the Main Street area, are technically feasible.

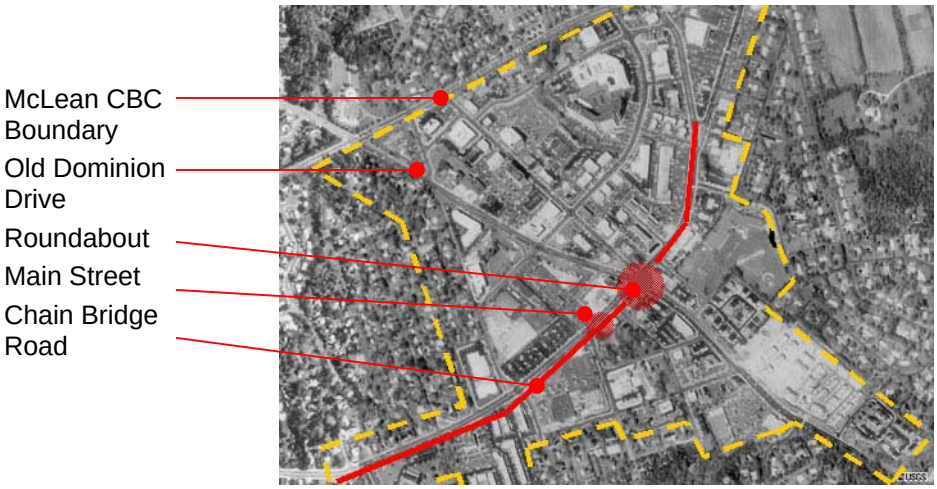


Figure 1. - Study Area

Study Approach

The LSG team investigated traffic and the condition of roadways and streetscape areas. The design team prepared overall plans showing proposed traffic calming and other recommended measures to be implemented on Chain Bridge Road, so that these could be reviewed by affected agencies. The plans include the layout of a roundabout at Old Dominion Drive and Chain Bridge Road, showing required right-of-way, curbs, lane lines, circle dimensions and, within this document, a description of its operation.

The plans also show the preliminary selection and location of landscape and beautification elements

including planting beds, streetlights, benches, bus shelters, and other features which will affect the ultimate layout of the streets and requirements for rights-of-way or easements. We expect that these design elements will be subject to further, extensive refinement in later stages, once the recommended road geometry has been adopted.

Study Document

This report begins with a description of the existing site conditions within the project area including a detailed analysis of existing traffic operations at the intersection of Chain Bridge Road and Old Dominion Drive. It continues with a detailed description of traffic calming measures analyzed, including the roundabout, and detailed descriptions of proposed streetscape improvements. The document concludes with an outline of implementation steps necessary to complete all project elements, and an estimate of probable capital costs and right-of-way acquisition necessary.

3. Existing Conditions

3.1. Existing Streetscape

Right-of-Way and Pavement

Both Chain Bridge Road and Old Dominion Drive are VDOT owned and maintained highways. Right-of-way widths on Chain Bridge Road range from 75’ to 95’ within the project area, with the narrowest areas generally between Ingleside Avenue and Old Chain Bridge Road. Old Dominion Drive averages 85’ – 94’ in the study area.

The pavement width of Chain Bridge Road within the project limits varies from 59’ to 61’ from face of curb to face of curb. Curbs consist of narrow gutter versions of CG-6, vertical curb and gutter, with typically 18” gutter pans rather than the current VDOT standard of 24”. Four 11’ wide lanes plus a center turn lane exist, and are proposed to be maintained. This prevents the opportunity for a raised median in all but a few limited locations. Most streetscape projects include replacement of older curb and gutter, pavement overlay and re-striping to improve a street’s overall appearance and driver safety. However, Fairfax County and VDOT may wish to consider accepting a non-standard gutter pan width, to minimize property takings. Narrow gutter pans have been retained in both the City of Falls Church and in the Town of Vienna as part of their streetscape projects on Routes 7 and 123.

Figure 2. – Existing Chain Bridge Road Streetscape

Pedestrian and Streetscape Areas

Sidewalks

Sidewalks within the project are typically concrete, 4 feet wide, and located on both sides of the street. Walkways are separated from the back of curb by narrow grass strips of between 2′ – 5′. Post mounted regulatory signage and some street trees are typically located in these areas. Most intersections and commercial drive entrances have accessible ramps. Crosswalks are striped in paint or worn thermoplastic markings.

Street Furnishings

Few, if any site furnishings exist for the convenience or comfort of pedestrians. Standard WMATA bus shelters are located at some stops. Collections of newspaper vending machines are also typically found at these sites.

Lighting and Overhead Utilities

Existing Lighting

Street lighting in McLean is a mixture of Fairfax County funded and Dominion Virginia Power provided sources in combination with nearby private fixtures. Existing power poles within the Old Chain Bridge Road right-of-way support cobra-head style luminaires. These lights are served from cable hung between lights, mounted directly on the poles. Additional light is provided by luminaires located in parking lots adjacent to Chain Bridge Road, and building mounted flood lights on many commercial structures.

Overhead Utilities

The location and type of overhead utilities varies within the McLean project area. Most overhead utilities are consolidated to one side of Chain Bridge Road, although this location shifts sides in multiple locations. Beginning at its intersection with Westmoreland Street, poles follow the north-west side of Chain Bridge Road, and cross to the south-east at Cedar. They remain on this side until just south of Brawner Street, where they cross over to the north, then cross back at the intersection with Old Chain Bridge Road. In addition to these major crossings, there are other locations where a single utility crosses to serve individual customers or to extend service down a side street. There are approximately ten such power and/or communication overhead crossings above Chain Bridge Road.

Typically, Dominion Virginia Power poles support primary power lines, Verizon telecommunications lines, and

additional cable or other telecommunication carriers. Verizon facilities are the heaviest cables, and closest to the ground, at a height of approximately 21 feet. Power lines are located on cross-arms at the top of the poles, and other facilities attached directly to the poles between power and telephone. Most local service drops to individual businesses are currently below ground.

Overhead ”strain wires” also cross Chain Bridge Road and side streets in multiple locations. These wires support traffic signal heads and the power and control wiring to them. There are approximately 7 overhead traffic crossings above Chain Bridge Road and adjacent side streets within the project area.

Figure 3. – Existing Tree Plantings

Street Trees

Unlike other revitalization areas within Fairfax County which began improvement efforts following the bond issue in the late 1980s, McLean has benefited from a long period of focus on its streetscape appearance. In 1970, the McLean Trees Committee began an organized effort to plant trees and shrubs on median strips, traffic islands, roadsides, and at public buildings, and to work cooperatively with local businesses to add plantings at parking lots and commercial sites. To date, over 5,000 plants have been installed.

Some of these efforts are evident within the project area, as is a local commitment to seek necessary permission required to plant within VDOT rights-of-way. Based on the current posted speed limit of 25 mph, and in accordance with AASHTO clear zone guidelines, trees may be planted an absolute minimum of 1′ – 6″ behind the face of a vertical (barrier) curb. AASHTO does recommend a 7′ – 6″ desirable distance to fixed objects, and a 6′ – 0″ minimum distance, however. These dimensions are based on speeds up to 35 mph, greater than in the project area. *VDOT Guidelines for Planting Along Virginia's Roadways* refers only to the 1′ – 6″ minimum distance from face of curb for design speeds less than 35 mph. Trees must also be limbed up to 6′ to allow sight distance at intersections and drive entrances.

The existing urban forest on Chain Bridge Road includes a variety of shade and ornamental tree species. Their locations and extent are illustrated in Figure 3.

3.2. Existing Traffic

Traffic Counts

Turning movement counts were conducted by BMI at seven signalized intersections for the AM (7:00-9:00 AM) and PM (4:00-6:00 PM) peak periods, as well as Saturday from 12:30-2:30 PM. Midday counts for weekday were not conducted. The seven intersections where turning movement counts were conducted are:

- Old Dominion Drive & Beverly Road
- Old Dominion Drive & Chain Bridge Road
- Old Dominion Drive & Whittier Avenue
- Chain Bridge Road & Old Chain Bridge Road
- Chain Bridge Road & Laughlin Avenue

- Chain Bridge Road & Tennyson Drive/Ingleside Avenue
- Chain Bridge Road & Westmoreland

A primary focus of the traffic analysis of Chain Bridge Road was to determine the feasibility of a roundabout at the intersection of Chain Bridge Road and Old Dominion Drive in terms of geometrics, operations and safety. Therefore, only the results at that intersection will be discussed here. The results from all of the turning movement counts are included in Appendix 3.

The intersection of Chain Bridge Road and Old Dominion Drive carried the greatest amount of traffic, approximately 2,660 vehicles during the AM peak hour of 7:45-8:45 AM, and 5,124 vehicles during the AM peak period. During the PM peak hour of 5:00-6:00 PM 3,725 vehicles traveled through the intersection, while 6,602 vehicles traveled through during the PM peak period. Finally, during the weekend peak hour from 1:30-2:30 PM 2,232 vehicles traveled through the intersection, and 4,271 vehicles traveled through during the weekend peak period. During the AM peak period, eastbound and westbound Old Dominion Drive carries the greatest amount of traffic, the majority of which is traveling through the intersection rather than turning left or right onto Chain Bridge Road.

Level of Service

From the turning movement counts, the level of service (LOS) at each of the intersections during each of the time periods was calculated; the results are shown in Table 1. Level of Service (LOS) is used to classify and grade traffic conditions using a scale of six ranges from A to F, where A represents very good traffic conditions and F represents very poor traffic conditions:

- LOS A describes a free flow conditions with low volumes and high speeds. Driver comfort is high and maneuverability is unrestricted;
- LOS B describes a reasonable free flow with high driver comfort and only slightly restricted maneuverability;
- LOS C describes stable operations, but there may be some tension in driver comfort and maneuverability is becoming noticeable restricted;
- LOS D describes borderline unstable operations. Driver comfort is poor, maneuverability is severely limited and there is queuing;

- LOS E describes extremely unstable operating conditions, with extremely limited maneuverability and excessive queuing and extremely poor driver comfort;
- LOS F describes a breakdown of traffic operations. There is almost no maneuverability and driver comfort is at its lowest.

The Virginia Department of Transportation (VDOT) provided traffic signal timings for each of these intersections, which were needed as part of the LOS calculations. All intersections along Chain Bridge Road are coordinated, and traffic signal timings have been optimized as much as possible. As seen in the table, the intersection of Chain Bridge Road and Old Dominion Drive currently operates at LOS D during the AM peak period, LOS D during the PM peak period and LOS C during the weekend peak period.

Table 1. Existing Level of Service

Peak Hour Period	Chain Bridge Rd. / Old Dominion Dr.	Chain Bridge Rd. / Old Chain Bridge Rd.	Chain Bridge Rd. / Tennyson Rd.	Chain Bridge Rd. / Westmoreland Rd.	Chain Bridge Rd. / Laughlin Ave.
AM	D	B	B	C	A
PM	D	B	C	D	A
Weekend	C	B	C	C	A

In addition to LOS calculations, CORSIM simulation of the study area for the AM and PM peak hours for a typical weekday and Saturday peak hour were conducted for existing conditions and for the proposed scenario of a roundabout at the intersection of Chain Bridge Road and Old Dominion Drive. A comparison of the selected measures of effectiveness estimated by CORSIM for the entire study area as well as the subject location was performed. In addition, a capacity analysis of the proposed roundabout was performed using the methodologies presented in the latest *Highway Capacity Manual* (HCM) and in *Roundabouts: An Informational Guide,* recently published by the Federal Highway Administration. Finally, the feasibility of the proposed roundabout from a traffic operations perspective was determined and traffic operational problems were identified from the analysis. An explanation and results from the analysis of the roundabout are discussed later.

The existing traffic signal at the intersection of Chain Bridge Road and Old Dominion Drive is currently operating with optimal timings; therefore, it has the greatest amount of green time allotted to each leg of the intersection as possible. Additional modification of the timings of one of the legs to allow more vehicles through the cycle would negatively impact the other legs of the intersection and the overall operation of the intersection.

Accident Data

Accident data for the period 1995 through 1999 for the intersection of Chain Bridge Road and Old Dominion Drive was gathered from VDOT. Results indicate that the intersection does not experience an extraordinary number of accidents, particularly when compared with the amount of traffic it carries. The following tables show the results from the accident analysis.

Table 2. Crash Severity, By Year

Year	Injury	Property Damage Only	Total
1995	4	4	8
1996	1	5	6
1997	4	6	10
1998	3	6	9
1999	1	6	7
Total	13	27	40

Table 3. Collision Type, By Year

Year	Rear-End	Angle	Head-On	Sideswipe	Pedestrian	Total
1995	3	4	0	1	0	8
1996	2	2	0	2	0	6
1997	2	6	1	0	1	10
1998	3	5	0	1	0	9
1999	2	3	0	2	0	7
Total	12	20	1	6	1	40

Table 2 shows the number of accidents by year that involved either injury or property damage only. The greatest number of accidents were reported as property damage only. Table 3 shows the types of collisions, by year. The greatest number were angle types, followed by rear-end types. These two types of accidents are common at signalized intersections. A common angle-type accident is when a left-turning vehicle crosses in front of an on-coming vehicle from the opposite leg. Rear-end accidents typically involve a following vehicle with a leading vehicle that has unexpectedly stopped at the on-set of the red signal.

Pedestrian Activity

As illustrated in the above Table 3, there was only one accident involving a pedestrian during the five-year period. The number of pedestrians that travel through this intersection is minimal. In fact, the number of pedestrians walking the entire length of the study corridor, along Chain Bridge Road from Old Chain Bridge Road to Westmoreland Street, is minimal.

A field observation during a typical Saturday midday on a fall afternoon revealed a very small amount of pedestrian activity between the Giant Shopping Center and the Gourmet Giant Shopping Center on Chain Bridge Road at Laughlin Avenue. There was some pedestrian activity between the two centers as well as one or two people waiting at a bus stop. There was a very limited amount of pedestrian activity observed at the Langley Shopping Center located north on Chain Bridge Road.

The reasons for the small amount of pedestrian activity at the intersection of Chain Bridge Road and Old Dominion Drive can be attributed to the low demand to cross this intersection to reach various activities and stores and to the difficulty in crossing with its configuration-each of the main legs of the intersection has a left turn lane and two through lanes making it a wide intersection for a pedestrian to cross.

4. Study Recommendations

4.1. Streetscape

Design Cross Section

The proposed streetscape for Chain Bridge Road is based on retaining the existing pavement width, and providing additional pedestrian areas and plantings without extensive impacts on existing rights-of-way. Typically, from the back of curb, the section consists of an 8′ – 12″ utility strip, a 4′ to 4′ – 4″ wide planting area, and a 5′ – 0″ wide sidewalk.

Design materials are typically divided into hardscape, or all man-made items such as paving, site furnishings, and landscape items, consisting of plant materials and other items necessary for their survival. Descriptions of materials follow:

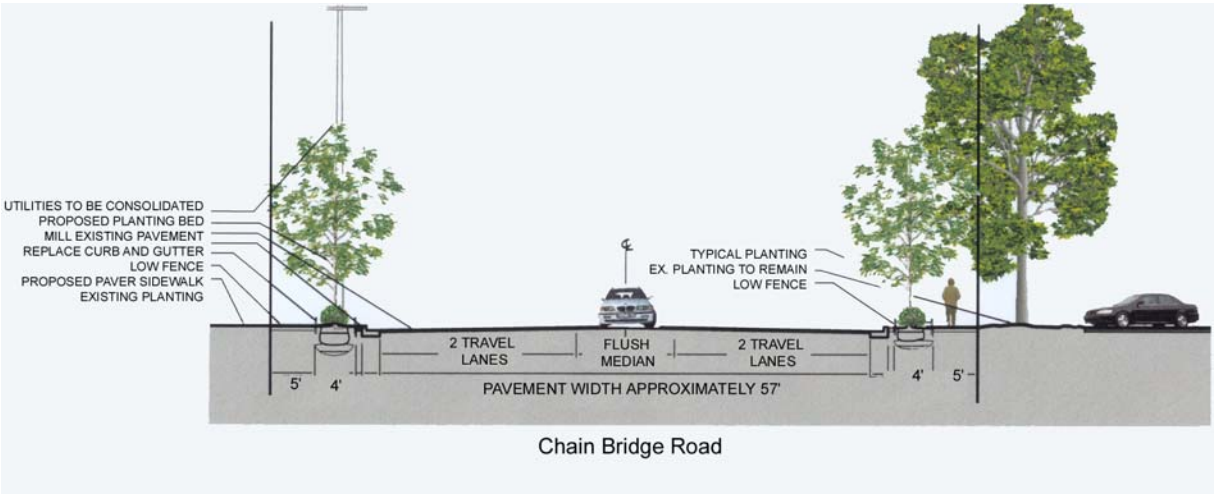


Figure 4. - Typical Chain Bridge Road Cross Section

Hardscape

Sidewalks

The proposed sidewalks will be a minimum of 5′ – 0″ wide, and will be paved in a combination of poured in place concrete, or pavers. Original MPC recommendations called for these materials to be combined, using decorative bands to separate fields of materials. However, there are a number of difficulties in constructing paver bands in fields of concrete, requiring precise tolerances so that excessive joint widths do not

result. There is a potential for differential settlement if bands are not placed over concrete slabs cast as part of the overall surface slab.

Consequently, the design team recommends using different sizes and colors of cast concrete pavers to create a similar appearance to scored concrete with periodic paver bands.

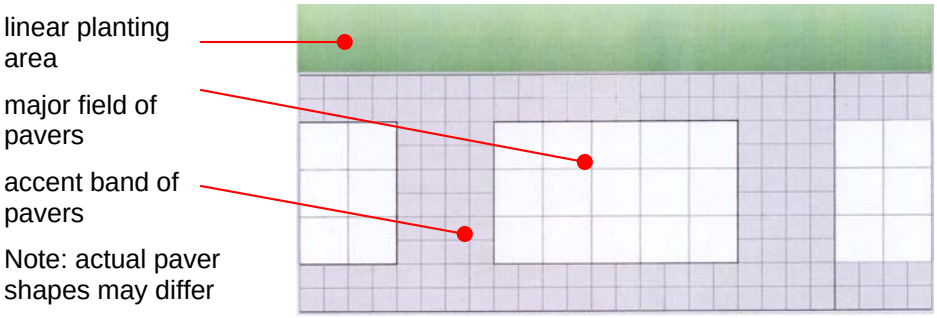


Figure 5. - Proposed Sidewalk Paving Pattern

Crosswalks and Medians

Crosswalks should be constructed of concrete pavers over a poured in place concrete base. This is a typical approach in this area, and follows a VDOT standard. Selected pavers should match sidewalk pavers in color, although tightly knit brick patterns, such as herringbone, are better suited to surviving the impact of automobile traffic.

Figure 6. - Proposed Crosswalk Paving Patterns

Figure 7. - Proposed Textured Median

Because of limited pavement width, medians cannot effectively be installed within the project area. In place of this, a textured median will be constructed to provide a traffic calming measure. This will function as a bi-directional turning lane, but will visually separate north and south bound lanes. This technique was successfully used on Elden Street in the Town of Herndon and the City of Fairfax. Either textured (stamped) colored concrete or concrete pavers over a concrete based can be used to create this effect. Stone cobbles set in mortar beds on concrete bases have been used in other parts of the county.

Street Furnishings

The *Open Space Design Standards* included within the *McLean CBC Special Study* provide a detailed list of recommended street furnishing for use within the CBC. During this study, the MPC further refined this list, developing recommendations for finishes, and exploring other elements. Some recommendations on the original list are more appropriate to commercially developed parcels, rather than publicly accessible streetscapes, and were thus not evaluated. As part of this study, specific locations for recommended furnishings were identified within the project area, so that their cost could be calculated as part of the overall budget.

Many of the recommended items were based on an urban system approach, where the design of all elements expresses the same dimensions and materials, and where various components are organized to minimize streetscape clutter. For example, the Se'Lux Environmental Design System URBI series street lights can be fitted to accept traffic signals, sign panels, trash receptacles, or similar elements. Other street furnishings were selected by the MPC to be compatible with this system.

Benches

Benches should be located at all bus stops within the streetscape area, and, if bus shelters are not equipped with seats, at all shelters. In consultation with business owners, benches should also be located near business which provide food or beverages, as pedestrians may wish to sit comfortably to eat. Benches should be provided at obvious gathering points - the McLean Teen Center, for example - where shoppers or others may wait for transportation, or gather for activities. Benches should also be provided in additional locations to avoid long stretches without opportunities for pedestrians to stop and rest.

Benches should be slatted wood or metal seats with steel or cast metal arms and frames. Metal parts should be finished in TGIC polyester powder coating.

Figure 8. - Proposed Bench

Figure 9. – Proposed Trash Receptacle

Trash Receptacles

Trash receptacles should be located in the same locations as benches. Typically at least one receptacle should be provided for not more than three benches in a single location. Receptacles should be fixed in place. Receptacles should be steel, finished in TGIC polyester powder coating, and interior liners provided in colors which are the same or similar to the metal finish

Railings and Bollards

Pedestrian traffic control in most of the world of includes the use of railings or barriers to help direct pedestrian to safe crossing points at difficult to negotiate or high automobile traffic intersections. Similarly, in narrow urban streetscape sections, low railings or metal fences are often used to minimize pedestrian intrusion into planting areas, and to prevent compaction of tree roots. The proposed roundabout and relatively narrow streetscape sections on this project make the use of pedestrian control devices an appropriate option to increase pedestrian safety and protect streetscape plantings. Proposed elements should include bollards and low fences to protect plantings. Both elements can be selected from the URBI line of products, and finished to match other site elements.

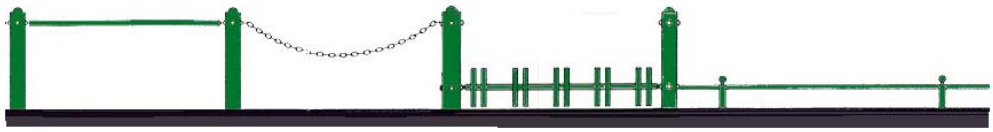


Figure 10. – Railings and Bollards

Bus Shelters

Proposed shelters were depicted, although not described in detail within the *McLean CBC Special Study*. Shelters provide an excellent opportunity to introduce a highly visible urban element which can be consistently located throughout the community. Useful shelters must shield transit patrons from the rain, wind and sun, provide seating and nearby trash receptacles, but not require extensive areas of sidewalk or additional rights of way.

Proposed shelters should be commercially available or adaptable from an available bus shelter. They should be constructed of steel or aluminum, and finished in TGIC polyester powder coating. Transparent parts should be constructed of mar-resistant Lexan® or other unbreakable material. Shelters should have signage mounted on them describing the nearest cross street or prominent community feature. Acceptable shelters include the following designs:

Figure 11. – Bus Shelters

Figure 12. – Newspaper Vending Area

Other Elements

Other streetscape elements which should be considered include a coordinated approach to newspaper vending, and some attempt to make standard traffic controls consistent with street furnishings.

A number of free and for-sale publications have vending facilities located within the project area, generally adjacent to bus stops. While there may be some legal constraints to compelling vendors to utilize standardized vending machines, many communities have successfully created attractive and functional newspaper vending facilities. If communities desire others to organize this effort, one national company will provide participating communities with a standardized vending device. It features multiple compartments for different publications to be clearly displayed on the sidewalk side. On the opposite, street side, space is provided for advertising. The newspaper rack provider markets this to fund the cost of the facility.

Traffic controls within the project area are owned, operated and maintained by VDOT. Ideally, mast arm poles and posts, pedestrian signal heads and poles and other vertical elements should be finished to match other streetscape elements. To date, this has been accomplished on locally maintained systems, such as those in the cities of Falls Church and Fairfax, and the Town of Vienna.

Landscape

Planting Concept

Consistent with the recommendations in the McLean CBC Special Study, plantings on Chain Bridge Road should provide comfort to pedestrians, complement the unified appearance of the streetscape and make walking, bicycling or traveling on Old Chain Bridge Road more pleasant or memorable. An orderly planting of trees can reinforce a sense of space and order along a commercial corridor whose architectural elements are too dispersed or dissimilar to provide this quality.

Urban trees suffer a variety of environmental stresses, including drought, excessive soil compaction, inadequate drainage, lack of aeration, limited area for root zone growth, poor nutrient quality of soils, road chemicals, and mechanical damage from persons or vehicles. The extent of these factors, and their impact has been widely

studied. One important contribution has been the development of a number of formulas to determine adequate space for successful tree growth.

Unfortunately, truly adequate areas for long term growth and survival would exceed available space within the McLean project area. The proposed design cross section can provide a good beginning for street tree survival, provided tree planting areas are made as extensive as possible in length, and provided with adequate subdrainage, irrigation, and specially designed soil mixes. Using this approach, similar areas in Falls Church and Vienna have been successfully planted with street trees.

Street Trees

Specified street trees on longer stretches of Old Chain Bridge Road should be selected from species most represented on those sections. While age and size of newly planted and existing trees may vary initially, over a period of growth, the streetscape will take on a more unified and consistent appearance. In many instances, existing plantings of dominant species extend to adjacent properties. This will add to the overall effect. In general, trees should also be selected from the recommended list contained in the *Open Space Design Standards*. The following street trees are recommended:

- Chain Bridge Road South of Old Dominion Drive – London Plane Tree. This is the dominant species on both sides of the street between Ingleside and Laughlin Avenue;
- Chain Bridge Road North of Old Dominion Drive – Little Leaf Linden. Lindens are currently planted between Corner Lane and Curran Street, and between Brawner Street and Old Chain Bridge Road;
- Proposed Roundabout – Zelkova. Zelkovas are currently planted at the Elm Street intersection. Upright ascending branches and elm-like form will make this an attractive tree with which to enclose the circle.

Impact of Overhead Utilities on Street Tree Plantings

The above recommendations are based on the ability of locate street trees outside of the impact area of overhead utilities. Alternatively, street trees can be planted on private property, behind areas where utilities are sited. Alternatives for treatment of overhead utilities are discussed in the next section. Should options be selected which allow some overhead utilities

to remain, additional street tree selections should be included which can be located beneath overhead wires. This is important, as overhead utilities currently cross Old Chain Bridge Road repeatedly, so that both sides of the street have sections with and without overhead utilities.

The following street tree selections may be substituted for larger trees:

- Chain Bridge Road South of Old Dominion Drive - Trident Maple, a smaller tree, has exfoliating bark comparable to the London Plane tree, and would be a suitable alternative. A standard, single trunk tree, form should be specified;
- Chain Bridge Road North of Old Dominion Drive – A number of different varieties of Callery Pear may be suitable for their shape and dark green foliage. Alternatively, tree-form Washington Hawthorne tolerates urban conditions well, and has glossy dark green foliage.
- Proposed Roundabout – Should the roundabout be constructed, we anticipate that nearly all overhead wires in the area will be located underground, due to limitations on pole locations and excessive spans between poles. However, if overhead utilities are retained, we recommend that the outside of the circle be planted in a ornamental flowering tree, such as Yoshino Cherry.

Linear Planting Areas

Within the linear planting areas, groundcovers and perennials should be used to provide seasonal interest and to assist in screening adjacent parking lots. These need to be carefully selected to minimize sight distance issues at commercial entrances and limit maintenance requirements:

- evergreen shrubs – evergreen shrubs, such spreading English Yews, should be planted periodically within the linear areas to provide winter interest and a consistent green background for other, more colorful perennial plantings;
- perennials – other areas of the planters should be planted in masses of flowering perennials, selected to provide an extensive bloom sequence over the summer, and attractive foliage through most seasons. Because the MPC has selected a dark green highlight color for street furnishings, we recommend a range of yellow and gold in flowering

perennial colors. We recommend Rudbeckia, Coreopsis, Goldenrod and St. Johnswort. Because some planting areas will essentially be in full sun until street trees mature, these locations are also acceptable for smaller ornamental grasses such as some varieties of Pennisetum;

- groundcovers – in addition, lower growing plants will be necessary in areas of limited visibility, or directly beneath trees. Recommended materials include Lirope in shade, possibly under-planted with spring flowering bulbs, and Daylillies or Cotoneaster.

Hedges

Where sufficient rights-of-way or additional easements permit, a 30″ – 42″ hedge of evergreen materials should be planted at the rear of the sidewalk to screen adjacent parking areas. Recommended materials include Manhattan Euonymus or varieties of Holly.

Figure 13. – Proposed Planting at Roundabout

Special Areas

The proposed roundabout provides a unique opportunity to create a highly visible planting feature within the McLean community. Materials must be selected to provide for sight distances, and plantings should be simple and attractive, but not overly distracting to motorists. It is also an excellent location to consider public art.

The basic plantings within the circle should include flowering shrubs with long bloom sequences and attractive forms. A number of landscape and groundcover roses are now available which do well in urban requirements. Ornamental grasses, which do well in full sun and exposure, would also be acceptable choices. Recommended

plantings within the circle can include seasonal color. While more expensive to maintain than perennials or flowering shrubs, this location deserves special treatment and additional expenditure if an interested organization or commercial enterprise is available to underwrite the costs.

Irrigation

Linear streetscape planters and the roundabout should be irrigated with an automatic irrigation system. Water-conserving drip heads or a combination of drip and spray heads should be used.

4.2. Overhead Utilities

Reasons for Relocation

Many people consider overhead utility wires and cable to be unsightly. These wires can obscure sightlines toward commercial signage and limit the effective height of street trees that can be planted. Overhead wires are subject to storm damage by wind or falling tree branches, and can also be damaged by vehicular accidents with poles. Pole locations or guy-wires can conflict with sidewalks, limiting pedestrian or bicyclist mobility. For these and other reasons, the *McLean CBC Special Study* recommended relocation of overhead utilities to underground.

In addition, consolidation of drive entrances and the potential construction of a roundabout will likely result in the need to move existing poles and overhead wires. This will also present an opportunity to minimize the appearance of these utilities.

Relocation Options and Costs

Consolidation Issues

There are a number of options available for minimizing the appearance of overhead utility lines. These include relocating all lines underground, locating some facilities underground, or relocating the main services to separate off-street easements. The options vary greatly in cost, and in their requirements for easements and the construction of additional underground facilities.

Any relocation option which includes moving facilities underground must also address any current overhead services to utility customers. New underground connections must be installed on the customer’s property, leading to new connections at the building. This work is typically not done by the utility companies, but must be arranged either by the customer or others.

Estimating the overall cost for such work is best done by each utility, as they are most knowledgeable of their existing equipment and planned service expansion. However, both Dominion Virginia Power and Verizon require

an engineering agreement to cover the cost of even the preliminary engineering necessary to estimate potential construction costs.

Complete Relocation of All Overhead Facilities to Underground Conduit

This is the most expensive option, because it involves the construction of new facilities (conduit and manholes) underground, new equipment above ground, easements for both kinds of work, changeover of service, and removal of existing poles. Only a limited number of conduit drops can be mounted on any one pole, thus, it often takes multiple poles to sequentially reroute all wires underground. Unlike providers in many denser urban areas, including Washington, DC., Dominion Virginia Power prefers to keep transformers and related components above ground, in pad mounted facilities, rather than placing them in below-ground vaults. The above ground pads are typically located outside of public rights-of-way, and on private property, requiring easements.

It is very difficult to estimate the cost of complete relocation, because it is dependent on the number and type of overhead facilities, the availability of suitable locations for underground conduit, the ease of acquiring easements, and the franchise agreements. The later is important for more recent utilities, such as cable television, who may have agreements for use of public rights of way which dictate that they locate their wires where directed by localities, including below ground, and without additional cost.

The Town of Vienna has recently investigated the cost of relocating utilities underground on Route 123, Maple Avenue, a road comparable in size and adjacent land use to Chain Bridge Road. At present, power facilities are located on one side of the street, and telephone on a separate set of poles on the opposite side. There are probably more frequent overhead street crossings than on Chain Bridge Road. Dominion Virginia Power estimated that to place all electrical power lines on Maple Avenue underground would cost approximately $857 - $1,549 per linear foot of street, depending upon how much of the necessary conduit, manholes and other preparatory work could be completed by the Town’s contractor, and how much by Dominion Virginia Power. Prior estimates for under-grounding utilities on Columbia Pike in the Annandale Revitalization area were approximately $968 per linear foot of street.

Relocation of Overhead Facilities to a Separate Easement

This is a less expensive option, because it involves the relocation of overhead utilities to a separate easement off of the public right-of-way. Savings accrue because the technology remains the same - overhead wires on poles – the current least-cost approach. Service to existing customers can remain above ground, or can be rerouted underground.

This option requires a suitable location for a utility easement, typically an alley separating commercial from residential areas. Without an available route, acquisition of the necessary easements can be a complicated process. If existing services to customers are underground, then significant disruption to them can occur as these are reconstructed to provide service from another direction. There are no recent local examples of this approach, and thus no estimates of probable cost.

Consolidation of Overhead Facilities and Partial Under-grounding

This solution is based on three important considerations: that relocation of power is more expensive than relocation of communications; that communication facilities are increasingly being located underground; and that current communications facilities are often more visually obtrusive than power lines alone. Estimates for under-grounding power facilities are usually higher, because of the need to change equipment to pad-mounted transformers, safety concerns, and the number of separate wires. Communications facilities, in contrast, are often partially underground already. Because these lines are lower, and often heavier, placing them underground, reduces the visual impact to that of the power lines alone. If the power lines are located on newer, straighter poles, their impact is further reduced.

The Town of Vienna recently completed a program of relocating all overhead Verizon facilities underground on parts of Maple Avenue and Church Streets. At the same time, Dominion Virginia Power facilities were consolidated to new poles on a single side of the street. Cable television facilities were not under-grounded for the initial projects, but will be relocated in subsequent parts of Maple Avenue. The utility company cost to construct facilities and change them over from old to new poles (power) or from overhead to underground (telephone) was approximately $265 per linear foot. This does not include the cost of the duct bank installed by the Town of Vienna’s contractor nor the cost of changing service connections at individual utility customers.

4.3. Street Lighting

McLean Planning Committee Recommendations

Recommended Fixtures

McLean Planning Committee Recommendations in the *McLean CBC Special Study* recommend that all exterior lighting in the CBC area be consistent. It also identifies separate standards for pedestrian lights, street lights, and parking lot lights. These Design Standards are established for both private and public areas.

The proposed street lights are the Se'Lux Environmental Design System URBI, a 200 to 400 watt pendant mounted luminaire designed to overhang the roadway. The manufacturer has designed the pole system to accommodate traffic signals, as well as lower pedestrian level luminaires. According to Fairfax County Department of Public Works and Environmental Services, an adequate light level for a commercial street such as Chain Bridge Road would be 1.2 footcandles, with a maximum average to minimum footcandle ratio of 4:1. To provide this level, fixtures would have to be located approximately 100 feet on center on alternating sides of the street. Luminaires would have to be mounted at a height of approximately 21 feet. Residential areas could be lighted to a level of 0.6 footcandles, with a maximum average to minimum footcandle ration of 4:1.

For primarily pedestrian areas, such as the proposed Main Street, a lower level fixture is proposed. Initially, this was to be the Se'lux Saturn1 lantern. To meet adequate light levels, it would have to be placed on 60 – 70 foot centers. However, the McLean Planning Committee is reviewing this lighting guideline based on concerns that the fixture may not meet dark-sky recommendations. An alternate, small pendant style fixture has also been proposed, although the approximate required spacing has not been determined.

Dark Sky Compliance

The MPC recommends that all fixtures be "dark sky compliant." International Dark-Sky Association (IDA) leads efforts to minimize adverse environmental impact on dark skies and promote quality nighttime lighting. The *IDA Lighting Code Handbook* provides an extensive and thorough description of how appropriately designed lighting can meet multiple objectives, including minimizing light pollution, glare, and energy consumption.

For roadway lighting, the Handbook refers to IESNA (in ANSI/IESNA RP-8-00) which strongly recommends that all roadway luminaires be fully shielded. IDA also prepared the *USA Pattern Lighting Code* as a guide for communities seeking to incorporate dark-sky friendly policies into local ordinances. This code offers a number of guidelines to govern outdoor lighting, including total outdoor light output standards. To be dark sky compliant, lighting in McLean should follow the guidelines outlined in the *IDA Lighting Code Handbook.*

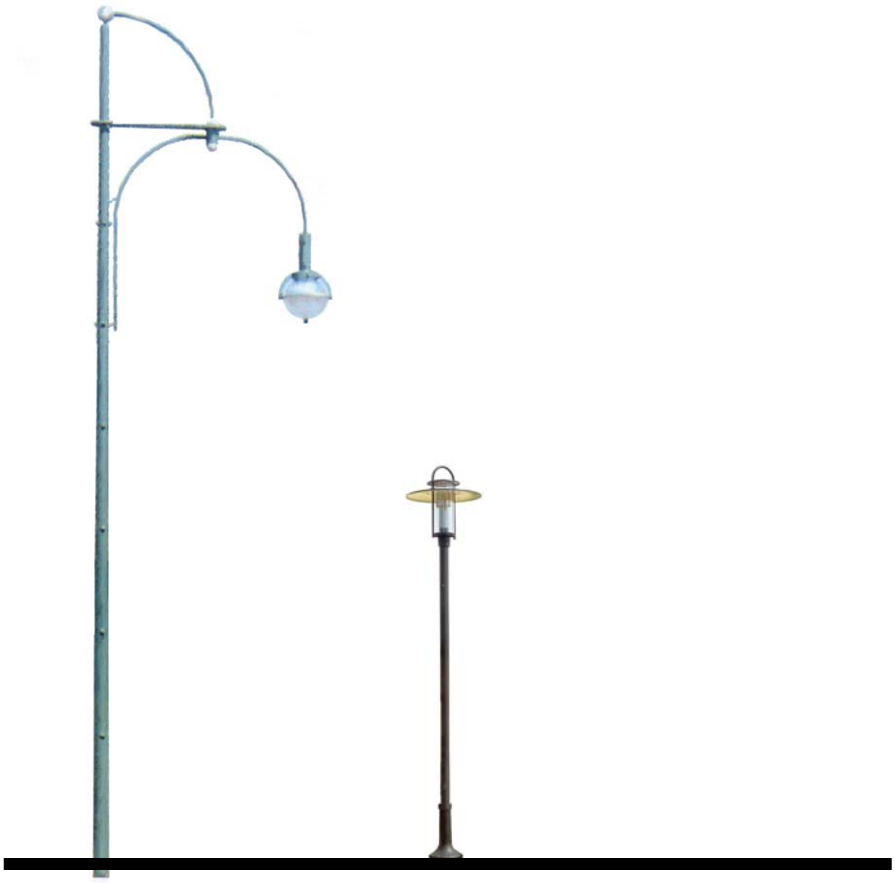


Figure 14. - Recommended Roadway and Pedestrian Light Fixtures

Currently Approved Fixtures for Use on Fairfax County Public Streets

Unfortunately, while it is possible for private owners to select their own light fixtures for use, fixtures located within public rights-of-way, such as Chain Bridge Road, can only be chosen from a few options. Dominion Virginia Power has an agreement with Fairfax County to provide and maintain a limited selection of fixtures located within Virginia Department of Transportation rights-of-way. The four available fixtures are as follows:

- Ultra – box shaped luminaire pole-mounted at an angle, similar to a floodlight. Used primarily to light large intersections, or multi-lane highways;
- Cobra-head – ubiquitous on streets and roadways throughout the Country. While optics have improved some, the outwardly visible form has remained the same for over 50 years;
- Washington Globe – a traditional "acorn" shaped luminaire mounted on a fluted pole. Many communities with prominent historic areas have installed these or comparable fixtures. However, the completely translucent globe available from Dominion Virginia Power allows light to escape up, and thus may not meet dark sky guidelines;
- Colonial – these are small lantern shaped fixtures mounted at relatively low heights. They have typically been used in residential subdivisions.

Only the Cobra-head and Washington Globe fixtures are well suited for use on community business center streets such as Old Dominion Drive or Chain Bridge Road. However, neither meets the design objectives identified in the *McLean CBC Special Study.*

4.4. Traffic Calming Measures

Study Alternatives

A number of traffic calming measures were considered as part of the Chain Bridge Road study. These include:

- curb extensions or chokers;
- chicanes;
- speed humps;
- raised crosswalks;
- pedestrian refuge islands or medians;

- painted edgelines;
- traffic circles (different than roundabouts).

Each of these traffic calming devices were assessed for their effectiveness for use on Chain Bridge Road. With the exception of medians, none were considered feasible options for reasons explained.

Curb Extensions

Curb extensions or chokers are used to narrow the street by widening the sidewalk/grass strip area and are used either mid-block or at an intersection. They can add a safety benefit for pedestrians by creating a shorter crossing distance and better visibility. But they are not installed on higher volume roads because their installation requires a reduction in the width of the travel lane. Therefore, this traffic calming strategy is not a viable alternative on Chain Bridge Road as there is no room to install them because some portion of the travel lane would have to be taken away. Chicanes are a series of chokers that are alternately placed on either side of the road to create a serpentine effect. These are used to slow travel speeds and, like chokers, are generally not used on higher volume roads like Chain Bridge Road.

Speed Humps

Speed humps are parabolic or flat topped raised pavement that are used to slow speeds of vehicles as they travel over them. They are typically only used on residential streets and not on roads with higher traffic volumes because, with slower speeds, they may cause a delay. Raised crosswalks are similar in design to speed humps. They are raised pavement on a road and are used to slow vehicle speeds. However, they are spaced over a longer distance and are used to indicate to motorists that there are pedestrians present and to be cautious.

Pedestrian Refuge Islands and Medians

Pedestrian refuge islands or medians are raised islands placed in the middle of the road, displacing a vehicle to the right. They can be oval or elliptical shaped. Those islands used at a crosswalk to provide pedestrian refuge increase pedestrian safety by allowing pedestrians to cross one direction of travel at a time. Curbed medians can also be used to enhance the roadway because they provide an opportunity for landscaping. These types of devices typically are installed on both residential streets as well as roads with higher traffic volumes, when there is space in the road to install them.

However, pedestrian refuge islands and medians are not effective on the majority of Chain Bridge Road because there is not enough travel lane width to add an island. Only one location provides enough space to add a median. A left turn lane southbound on Chain Bridge Road into the Gourmet Giant Shopping Center can be shortened and a small median can be installed. This can act as a pedestrian refuge island as well. This median is illustrated in Figure 15. One potential alternative, a flush median, is discussed later in this report.

Other Alternatives

Parking edgelines are white paint lines placed approximately eight feet from the pavement edge effectively narrowing the traveled portion of the roadway by creating a parking lane or shoulder area. This device is not feasible on Chain Bridge Road because there is no extra travel lane width.

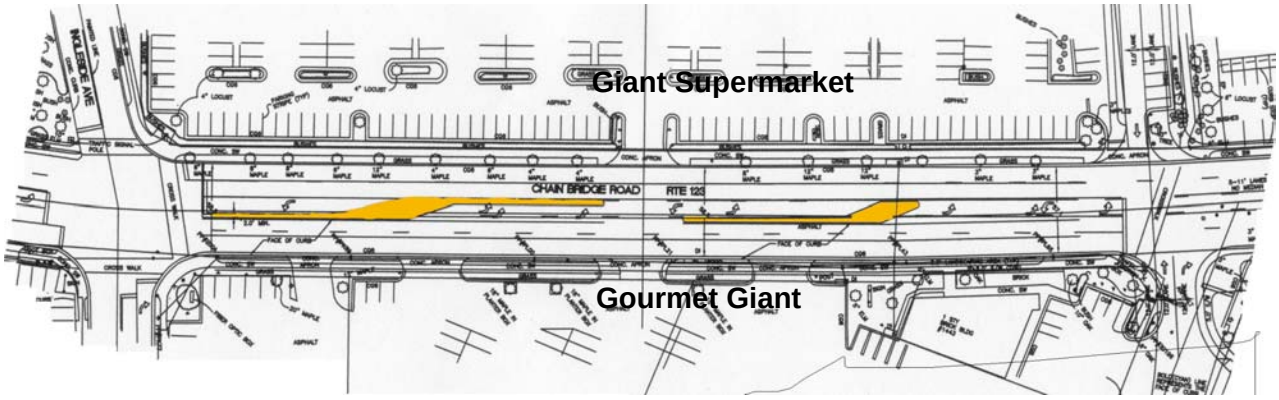


Figure 15. - Potential Median Location

Finally, traffic circles are a smaller version of the roundabout and are used at four leg intersections that experience relatively equal traffic volumes on all legs. Traffic volumes on Chain Bridge Road are too high for this to be a viable measure at its intersection with Old Dominion Drive. Traffic circles are typically installed on residential roadways. The other intersections on Chain Bridge Road are not wide enough to support the construction of traffic circles.

Property Description	Existing Entrances	Proposed Entrances	Entrances Removed	Required for Roundabout
McLean Commerce Building	1	0	1	No
First Virginia Bank	1	0	1	No
Total Beverage, Super Crown	2	1	1	No
SunTrust Bank, Track Auto, Fairfax Cleaners, Gourmet Giant	1	0	1	No
1431 Chain Bridge Road, Firestone	1	0	1	No
Amoco	1	0	1	No
1423 Chain Bridge Road, Amoco	4	1	3	Yes
Exxon	3	2	1	Yes
Sunoco	3	2	1	No
Best Buy Carpet, Furs of Kiszely, Fred F. Farahi, DDS, David Roberts Jewelers	2	1	1	No
1387 Chain Bridge Road, Jeff Lubin Photography, McLean Service Center	2	1	1	No
Starbucks	2	1	1	No
1436 Chain Bridge Road, Pool Doctors, Cigar Vault, Asian Corner Restaurant, A-1 Nutrition, Cleaners, Figuroes Salon	1	1	1	No
	2	1	1	No
Total			**16**	

Table 4. – Potential Entrance Consolidations (see next page for notes)

NOTES:

1. Existing entrances were determined from base surveys; there may be additional entrances on side streets that are beyond the scope of the available information.
2. Entrance to some properties can be made through existing parking lots.
3. Combined entrances are proposed for the retail centers including Best Buy Carpets, Furs of Kiszely, etc., and 1387 Chain Bridge Road. One entrance will be removed from each parcel and a shared entrance will be constructed.
4. A combined entrance is recommended for Starbucks and 1436 Chain Bridge Road. One entrance will be removed from each parcel and a shared entrance will be constructed.

Table 4., continued – Potential Entrance Consolidations

Driveway Consolidation

In addition to the above traffic calming measures, the possibility of consolidating driveways was examined. One of the main problems on Chain Bridge Road is the large number of driveways, which becomes problematic when vehicles turn in and out of these driveways at all points along the road, rather than at intersections. This slows traffic, creates vehicle conflicts and leads to accidents. In some locations, businesses have more than one entrance and exit. By consolidating driveways, locations will be provided with shared access to shopping centers and businesses. Suggested driveway consolidations are summarized in Table 4.

4.5. Special Areas – Main Street

Main Street Concept

The future "Main Street" concept was recommended in the *McLean CBC Special Study.* Nearly all commercial and retail businesses within the McLean CBC are automobile oriented and set back from Chain Bridge Road or other major streets by extensive surface parking lots. The MPC recommended that McLean have at least one pedestrian based shopping street where buildings fronted a walkable, relatively narrow street with parallel parking. The *Open Space Design Standards* further recommend a raised median in the center of this street, designed to accommodate vendors, and multiple uses if, for example, this street was closed for a sidewalk festival. Due to these special design considerations, Main Street was envisioned to be privately owned and maintained, although publicly accessible, similar to the main shopping street in Reston Town Center.

As part of this study, the design team reviewed the location, proposed lane widths, and other physical characteristics of Main Street to determine its configuration as it intersected with Chain Bridge Road. This included discussions with Fairfax County Fire officials. They indicated that the paved roadways fronting any buildings would require a minimum pavement width of 24’ if a raised median were used to divide the street. This could compromise the proposed design. This study recommends a modified version of the Main Street, with a flush median, providing an acceptable drivable surface for emergency vehicles. This modified cross section follows:

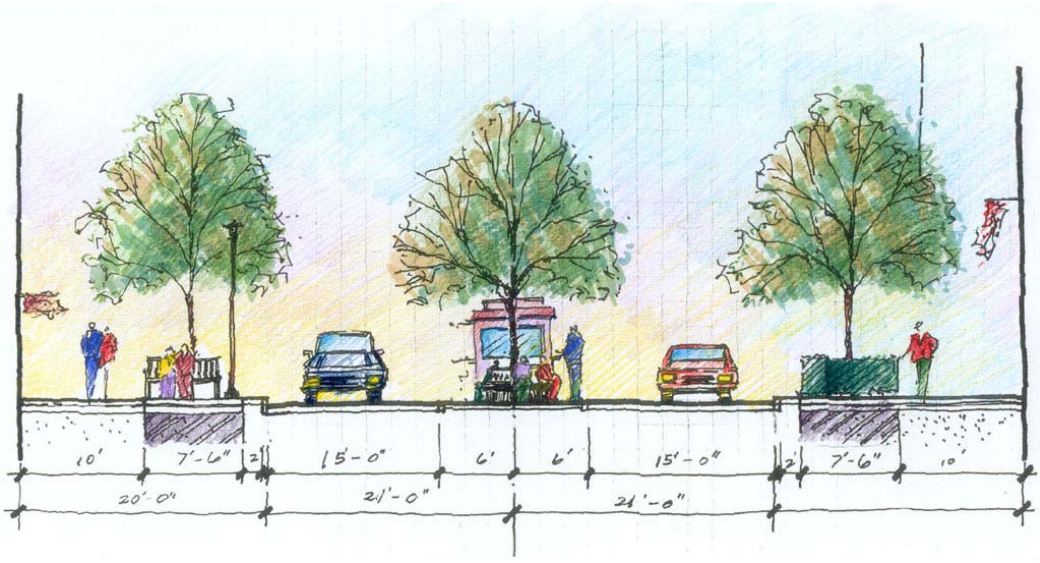


Figure 16. - Main Street Modified Design Section

Traffic Analysis

An analysis of possible volumes on the future Main Street was conducted to determine its effect on the overall traffic flow on Chain Bridge Road. The analysis of future volumes on Main Street was conducted using existing traffic volumes at the intersection of Chain Bridge Road and Laughlin Avenue. It does not include movements from the Giant driveway, but rather is based on volumes from Laughlin Ave and both directions of Chain Bridge Road. The analysis considered several assumptions, including the following:

- exiting volumes from eastbound Main Street were estimated by taking 50% of inbound volumes and then doubling left and right turns;
- future growth was estimated to be 33% based on potential land uses of primarily retail;

- retail land use generates approximately 50% of traffic in and 50% of traffic out;
- left turns onto westbound Main Street were estimated by taking percentage of existing northbound left turns to existing northbound total;
- through numbers for eastbound and westbound Main Street are arbitrary numbers, typically the number five is used.

Northbound existing peak hour volumes were used. Northbound totals were factored by 33% to estimate future growth. Northbound left turns into, southbound right turns into, and southbound right turns out of Main Street were estimated by using the percentage of existing northbound left turns from the total northbound traffic. Eastbound exiting traffic was estimated by using 50% of the westbound traffic and then doubling left and right turns.

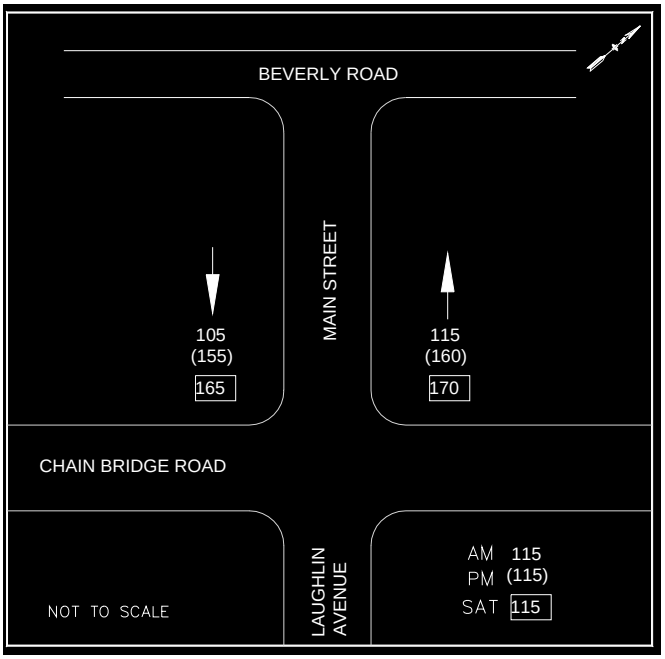


Figure 17. - Projected Traffic Volumes on Main Street

The results of the estimates of traffic volumes for the weekday AM and PM peak hours and weekend peak hour on the future “Main Street” are shown in Figure 17. It is estimated that approximately 115 northbound vehicles will enter and 105 vehicles will exit Main Street during the AM peak hour, 160 vehicles will enter and 155 will exit during the PM peak hour and 170 will enter and 165 exit during weekend peak hour.

The future Main Street is proposed to intersect Chain Bridge Road at a four-leg intersection with Laughlin Avenue comprising the southern leg of the intersection. Currently, Laughlin Avenue and Redmond Drive both intersect Chain Bridge Road in offset “T” intersections. It is proposed that the intersection of Laughlin Road will be realigned so that Main Street, Laughlin Avenue and Chain Bridge Road will all intersect and be controlled by the existing traffic signal.

The construction of the Main Street concept will impact available parking in the Giant Supermarket. Approximately 32 spaces will be lost in the construction of the Main Street between Chain Bridge Road and Center Street, although some spaces may be replaced by parallel parking. However, detailed study of existing parking capacity within the project area, and the impact of proposed improvements on parking, were not included as part of the analysis.

4.6. Special Areas – Roundabout

Purpose and Need for a Roundabout

The scope of this study included a feasibility analysis of a roundabout at the intersection of Chain Bridge Road and Old Dominion Drive. The principal reasons for recommending a roundabout in the original *McLean CBC Special Study* were for aesthetics and pedestrian safety. Another concern was the high volume of traffic carried by the existing intersection, and the consequent long delays, particularly during peak periods. The existing traffic signal is optimized to provide as much green time as possible, yet vehicles can become stuck in a queue and unable to make it through one cycle. Many believed, based on personal experience with roundabouts in other locales, that a roundabout might help the operation of the intersection by eliminating the need for a traffic signal, and would additionally add the opportunity for more landscape area at the intersection.

Figure 18. - Site of Proposed Roundabout, Looking West on Old Dominion Drive

Operation

Roundabouts function similarly to a traffic circles in that traffic moves counterclockwise around a raised circular island. However, a traffic circle is different than a roundabout in several respects. A traffic circle carries less traffic and is typically installed at the intersection of residential streets. Motorists already in the traffic circle must yield to entering motorists. Traffic circles typically have no deflection at the entry points and often allow larger vehicles to turn left in front of the circle because of its smaller turning radius.

In contrast, roundabouts are larger in design and are constructed at locations where there are heavier volumes

of traffic. Entering motorists are expected to yield to motorists already in the circle. Entry points are deflected to require entering vehicles to slow down at the approach to the roundabout. All vehicles circulate around the central island and larger vehicles are expected to do the same. Typically, the outer diameter of the raised island is approximately 100 feet, which allows for a large enough deflection to reduce speeds to the appropriate level. Triangular islands at each entrance slow approaching vehicles, and entering vehicles yield to circulating traffic with no stopping required. Pedestrians are not allowed to cross inside the circle. Rather, they cross at the perimeter, some distance away. Motorists desiring to turn left must travel around the circle until they reach their desired street.

Advantages and Disadvantages

The advantages of a roundabout are:

- improved traffic flow by reducing delays;
- improved aesthetics by eliminating the traffic signal;
- cost savings by eliminating the traffic signal;
- improved safety by reducing crashes, particularly right-angle, and left-angle crashes;
- slower speeds;
- safer for pedestrians and bicyclists;
- reduce noise and fuel consumption.

However, there are some disadvantages, which include:

- unfamiliar to many drivers;
- double lane roundabouts may have more conflict points than single roundabouts because drivers may use an incorrect lane or make an improper turn;
- pedestrian crossings can no longer be made in the intersection, but rather several hundred feet away.

Experience

Roundabouts are a relatively new concept in the United States, although they have been very popular in Europe. They have begun to gain popularity in the United States, as evidenced by the increase in construction in Colorado, Florida, Maine, Maryland, Michigan, Nevada, Vermont and Washington. VDOT is looking for opportunities to install roundabouts where appropriate.

Roundabout Geometry

The proposed roundabout at the intersection of Chain Bridge Road and Old Dominion Drive should be designed as an urban double-lane roundabout to maximize capacity and because both existing roads have four lanes. The basic plan geometry was based on current FHWA guidelines described in Bruce W. Robinson's *Roundabouts: An Informational Guide,* (June 2000). In addition, B&N and BMI reviewed the layout of the roundabout with FHWA Project Manager Joseph G. Bared, whose work at the agency focuses on roundabouts.

Based on current FHWA guidelines, the inscribed circle diameter was designed to be 150 feet with two 16 feet lanes within the circle. All exit widths are flared to 14 feet. The entry widths on Chain Bridge Road are flared to 13 feet, while the entry widths on Old Dominion Drive are flared to 14 feet. Each corner has different entry and exit radii. To increase capacity it is desirable to have larger exit than entry radii. The proposed design illustrated on the accompanying plans conforms to this at all four corners. Pedestrians are aided in crossing prior to the roundabout by the use of refuge islands that are designed to be six feet wide. Figure 19 shows the proposed location and preliminary geometry.

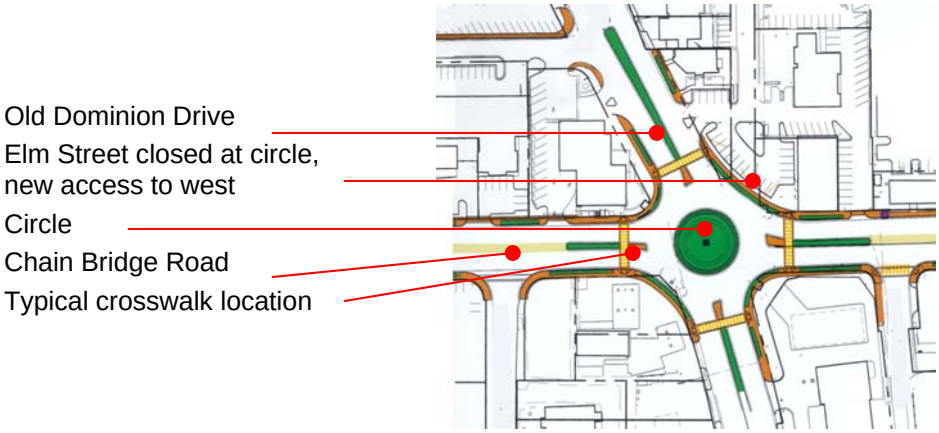


Figure 19. - Proposed Roundabout

The preliminary design of the roundabout has been limited to a horizontal alignment, and vertical profiles of the intersection have not been prepared. They would generally be addressed at a later point in the design process. Sight distance for vehicles entering the roundabout from Chain Bridge Road west and looking north on Old Dominion Drive may be inadequate based on current design standards. Further detailed design is necessary to determine the available sight distance. In order to accommodate the roundabout, significant right of way

acquisition will be required. In addition, access to Elm Street will need to be relocated farther west on Old Dominion Drive.

Evaluation Procedure

Available Analysis Tools

Traffic operations through a roundabout are quite different than through the more conventional sign controlled or signal controlled intersections. Research of the different roundabout analysis tools identified several computer models, including Sidra, Rodel, and Arcady that can be used to analyze traffic

operations through a roundabout. While all of these models were developed outside the United States, it was found that Sidra is the most widely used and accepted tool in the United States for analyzing roundabout operations. Maryland State Highway Administration (MDSHA) uses this program to analyze the feasibility of roundabouts within Maryland. Sidra was selected for this analysis because it has the following advantages over other models:

- there is a United States module in the program that has traffic parameters similar to those in the HCM, applicable to driving/traffic conditions in the U.S.;
- it can analyze signalized intersections, thereby making it easier to compare the roundabout alternative to the signalized condition.

Geometric and traffic volume and turning movement data for the study area were obtained from the field. Existing traffic signal timing and phasing data were obtained from VDOT.

Based on the ten-year growth from the Washington Council of Government's (COG) regional model, a 6.25% growth factor was applied to the existing traffic volumes to estimate traffic volumes five years in future. This estimate represents the higher end of the anticipated traffic growth throughout the study area. Hence, these estimated traffic volumes were used for the analysis to represent the worse case scenario. Sidra was used to analyze the future traffic conditions at the intersection of Chain Bridge Road and Old Dominion Road under the following two situations:

- traffic signal control;
- proposed roundabout at the intersection, (eliminating the traffic signal).

Table 5. Operational Analyses - Sidra MOE Comparison (Future Growth Volumes)

Approach	Time Period	Delay (sec/veh)		Deg of Saturation		LOS		Average 95% Queue (vehicles)	
		Signal	Round-about	Signal	Round-about	Signal	Round-about	Signal	Roundabout
NB Chain Bridge Rd	AM	33.9	13.5	0.474	0.503	C	B	13.7	3.5
	PM	40.3	30.1	0.694	0.937	D	C	21.9	16
SB Chain Bridge Rd	AM	33.6	11.3	0.586	0.431	C	B	11.7	2.5
	PM	45.5	25.4	0.972	0.916	D	C	25.8	17.4
EB Old Dominion Rd	AM	36.1	14.3	0.643	0.586	D	B	20.3	4.9
	PM	44.4	101.6	0.812	1.152	D	F	28.1	43.4
WB Old Dominion Rd	AM	36.0	11.8	0.547	0.471	D	B	17	2.9
	PM	38.7	15.7	0.644	0.700	D	B	22.2	6.2
Intersection	AM	35.1	12.8	0.643	0.586	D	B	n/a	n/a
	PM	42.5	44.6	0.972	1.152	D	D	n/a	n/a

Sidra Analysis

Results of the Sidra analysis are presented in the following Table 5 and illustrated graphically in Figures 20 and 21. The key Measures of Effectiveness (MOE's), which are the criteria used for comparing and evaluating traffic conditions at intersections, were as follows:

- LOS;
- average delay (in seconds per vehicle);
- degree of saturation (i.e., the ratio of traffic demand volume to the available capacity);
- 95th percentile queue lengths (in number of vehicles).

Based on the results from the Sidra analysis, traffic operations through the intersection of Chain Bridge Road and Old Dominion Drive is projected to improve with the installation of the roundabout. For the AM peak hour, all the approaches to the intersection are expected to experience significantly lower delays with the roundabout as compared to the existing conditions with the signal control. The overall intersection level of service is expected to improve significantly.

Sidra also estimates lower delays, with corresponding improvement in the level of service, for the roundabout design as compared to the signal control, during the PM peak hour for all approaches. The exception is eastbound Old Dominion Road. This approach is expected to experience higher delays during the PM peak hour. However, it should be noted that this analysis was based on a projected worse case traffic volume scenario. Also, it did not consider any diversion of traffic to alternate routes, which is very likely, especially for the commuter traffic that is simply passing through downtown McLean during the PM peak hour.

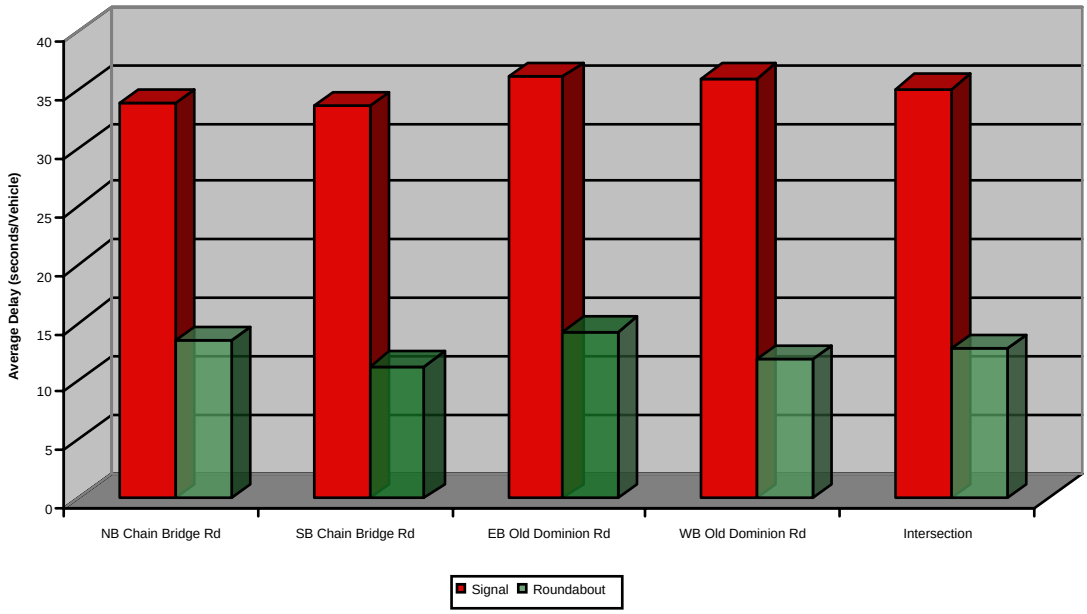


Figure 20. Average Delays - Future AM PEAK Hour Traffic Volumes

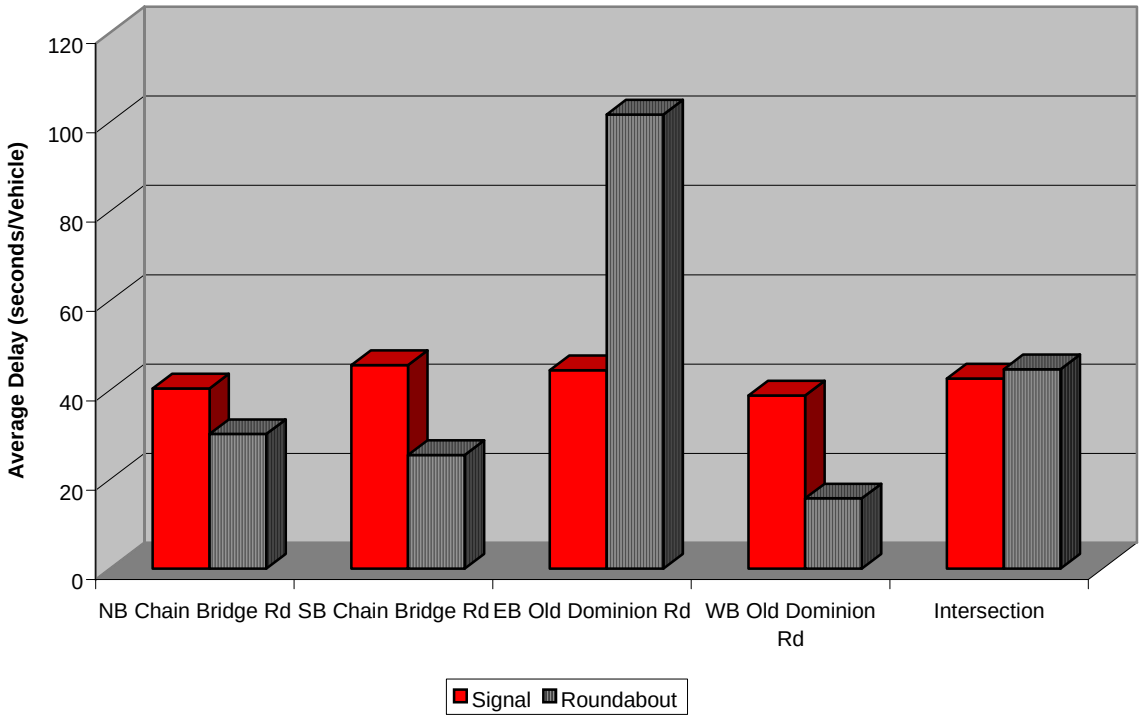


Figure 21. Average Delays - Future PM PEAK Hour Traffic Volumes

CORSIM

CORSIM, the most commonly used traffic simulation program in the U.S. for urban streets, was also used for visual representation of the traffic around the roundabout. Although CORSIM does not have the capability to replicate the traffic maneuvers around a roundabout, it was able to closely approximate traffic operations at the roundabout for unsaturated conditions. The simulation was used for visual presentation only.

Safety Benefits

Numerous studies of international roundabouts prove that roundabouts are safer than more traditional traffic control measures such as stop signs or traffic signals. Roundabouts are associated with a reduction in the number of accidents, particularly injury related accidents. Injury crashes are reduced more dramatically than crashes involving property damage only (PDO) because roundabouts eliminate severe crashes such as left turn, head-on and right angle accidents. In addition, collisions tend to be less severe than at conventional intersections. The use of roundabouts increases safety at the intersection for several reasons:

- fewer conflict points, therefore, potential for hazardous conflicts such as right angle and left turn crashes is eliminated;
- low absolute speed of drivers approaching and around the roundabout allows drivers more time to react to potential conflicts;
- road users travel at similar speeds, thereby reducing speed differentials.

A review of literature on the safety benefits of roundabouts shows that a single lane roundabout reduces vehicular crossing speeds by converting all movements to right turns. A four leg, single lane roundabout has 75% fewer vehicle conflict points as compared to a conventional intersection. Most severe vehicular crossings are eliminated. They are replaced by less severe merging conflicts, typically low-speed sideswipes. Overall, the severity of most conflicts is typically less than that found in alternative intersection controls. Additionally, the risk of pedestrians being involved in severe collisions is lower at roundabouts than other forms of intersection control due to slower vehicular speeds and a lower number of conflict points.

5. Implementation

5.1. Implementing Streetscape Improvements

There are multiple ways to accomplish the physical improvements required to revitalize a commercial district. Localities can construct streetscape projects as separate public works capital projects, they can combine streetscape improvements with other planned roadway or utility projects, or they can adopt design guidelines and secure commitments from individual builders and developers to implement streetscape improvements as part of site plan or rezoning approvals.

Most projects completed to date in northern Virginia have been constructed as part of bond issues to fund streetscape improvements. Streetscape projects in Falls Church have been also accomplished as part of larger VDOT funded-improvements on Route 7. There, the City paid for the difference between the cost of “enhancements” such as brick sidewalks, and what would customarily be installed. Both Falls Church and the Town of Vienna have been successful in requiring new construction to include standard streetscape components including brick paving, street trees or street furnishings.

Currently, most northern Virginia communities are contending with the installation of underground conduit for high speed data connections. Contractors doing such work have a requirement to leave work areas in the same of better condition as they have found them. Often, their work requires reconstruction of sidewalks, curbs or other surface improvements. It may be possible to combine the necessity of making these repairs with the installation of streetscape elements such as new paving or additional underground conduit to make future utility relocation possible.

We anticipate that the creation of streetscape improvements in McLean will utilize all possible approaches. Projects requiring extensive roadway construction, such as the proposed roundabout, are best completed as part of County or VDOT initiated transportation projects.

5.2. Demonstration Project

Creating a Demonstration Project

A demonstration project often provides a valuable starting point for a program of streetscape improvements. Here, a limited palette of elements can be installed and business district users can experience a portion of what the completed installation will look like and how it will function. Demonstration projects can address the most unattractive areas, can provide an opportunity to determine if proposed techniques or design standards are adequate, and can yield actual construction cost or sequencing data which can be applied to later phases.

Selection Criteria

Demonstration projects should be selected for their combined practicality and impact:

- sites should be centrally located within the project area, and should provide significant visual or other impacts when completed;
- projects should pose limited constructibility challenges. For example, in McLean, areas should be selected which do not require under-grounding of utilities, so that funds can be spent on highly visible improvements;
- work should require no acquisition of additional rights-of-way, nor easements, usually a time consuming and potentially expensive process;
- locations should be positively correlated with private investments, either to reward completed private initiatives, or to leverage additional private investment in streetscape development;
- projects should showcase the complete range of streetscape elements, from paving to planting and street furnishings.

Alternative Locations

There are a number of potential locations for demonstration projects in the McLean Project area. Each meets some or all of the above criteria. Each should be considered further by the McLean Revitalization Corporation as it seeks to identify a place to begin the transformation of Chain Bridge Road.

- Laughlin Avenue, South side of Chain Bridge Road – improvements at this location could be accomplished in conjunction with the private development of the

planned Civic Place. Public participation could include the realignment of Laughlin Avenue to meet the proposed Main Street, or construction of new bus shelter and crosswalk. This option is dependent upon the timing and acceptability of the Civic Place site plan submission;

- Old Fire Station, North side of Chain Bridge Road – improvements could include closing of Redmond Drive, reconfiguring the parking to make it more efficient, construction of a paver crosswalk at the proposed Main Street, or other improvements on Chain Bridge Road;
- Giant Supermarket Frontage, North side of Chain Bridge Road – Giant supermarket recently completed architectural and site improvements, including installation of new light fixtures matching the originally selected pedestrian scale fixture. New streetscape improvements could include sidewalk paving, street furniture and crosswalks at the proposed Main Street;
- Curran Street to Langley Shopping Center, North side of Chain Bridge Road – with the exception of one crossing at Curran, there are no overhead utilities on this short segment of the street. This largely open frontage could be greatly improved by the additional of street trees and plantings to screen off-street parking. Other improvements could include sidewalk paving and crosswalks at Curran.

5.3. Project Costs

Right-of-Way Requirements

Despite a commitment to limit expansion of the streetscape area to be within the existing Chain Bridge Road right-of-way, three specific circumstances require additional right-of-way to be secured by acquisition of either property or easements. The proposed streetscape section is designed to provide minimal areas for street tree plantings and pedestrian circulation, without adding lane widths or capacity. However it will still exceed the existing right-of-way in many locations. In general, these impacts are minor, and donations of necessary landscape easements may be successfully negotiated with abutters.

Second, more extensive right-of-way acquisition, and potential inter-parcel access agreements will be required to complete the proposed driveway consolidation and access management strategies. Third, the single greatest

need for new property rights acquisition is the proposed roundabout. This right-of-way acquisition would involve more detailed discussions with affected property owners, as current access locations would have to be changed and their numbers limited.

Typically, right-of-way can be acquired during site planning or rezoning applications for the subject properties. Alternatively, abutting property owners can voluntarily grant landscape easements to Fairfax County for smaller impacts. We anticipate that some land rights, typically for expansions of sidewalk, or planting of street trees behind the sidewalk, may be acquired in this way. A detailed breakdown of necessary land rights is found at the end of this report, and in the accompanying plan sheets. We have made no estimate of possible cost to acquire these rights fee simple.

Construction Costs

Streetscape construction costs can be divided into three major cost groups: utility relocation; streetscape and roadway improvements; and maintenance of traffic. Utility relocation costs can make up between a quarter to over one-half of a proposed project, particularly if complete under-grounding of utilities is anticipated. Similarly, maintenance of traffic can account for a significant portion of a proposed budget. Unless complete street closures are possible, most streetscape projects must be accomplished incrementally, with pedestrian and vehicular access preserved for each business. Certain streetscape components, such as crosswalks, must be constructed while still allowing cross or side street access. Consequently, lane marking, barriers, special signage and other maintenance of traffic work items may make up a large, but ultimately unseen, part of a project’s budget.

Briefly, costs may be summarized as follows. A complete breakdown by unit cost is included at the end of this document.

ITEM #	DESCRIPTION	COST	TOTAL
A	ROUNDABOUT		
	Construction	$598,145	
	Utility Relocation	$600,000	
	Maintenance of Traffic	$400,000	
	Mobilization @ 5%	$79,907	
	Design, engineering and contingency @ 20%	$335,611	
			$2,013,663
B	CHAIN BRIDGE ROAD EXCLUDING EMERSON AVENUE TO CORNER LANE		
	Construction	$2,107,447	
	Utility Relocation	$1,095,000	
	Maintenance of Traffic	$300,000	
	Mobilization @ 5%	$175,122	
	Design, engineering and contingency @ 20%	$735,514	
			$4,413,083
C	TOTAL		**$6,426,746**
D	Total Project Length	4,175	
E	Project Length not including area of roundabout (Emerson Avenue to Corner Lane)	3,760	
F	Average Cost, per linear foot		$1,174
G	Length of Chain Bridge Road, Emerson Avenue to Corner Lane	415	
H	Estimated Construction Cost without Roundabout, Emerson Road to Corner Lane		$487,082
I	TOTAL COST WITHOUT ROUNDABOUT		**$4,900,165**

Table 6. – Estimated Construction Costs

Thus, based on current capital estimates, construction of the Chain Bridge Road streetscape, excluding Emerson Avenue to Corner Lane (the area of the roundabout) will cost approximately $4.4 million, or roughly $1,175 per linear foot. The roundabout area is anticipated to cost approximately $2.0 million. Eliminating the roundabout minimizes the amount of construction necessary on Old Dominion Drive, and would thus reduce the overall project cost from $6.4 million to approximately $4.9 million.

5.4. Project Phasing

Recommended Phasing Plan

Preparation of this study represents the first in a series of steps to realize improved pedestrian and visitor experience on Chain Bridge Road and within the remainder of the McLean Community Business Center. To date, this study has completed traffic analysis and site survey of the project area, and developed a preliminary design for modifications to road geometry and new streetscape improvements. This is consistent with the typical sequence of Fairfax County Public Works and

Environmental Services projects. The complete process, may be summarized as follows:

- Survey Phase – completed;
- Preliminary Design – completed;
- Intermediate Design – begin consultation with affected agencies and utilities;
- Final Design – secure land rights, funding and complete plans for bidding;
- Construct Project.

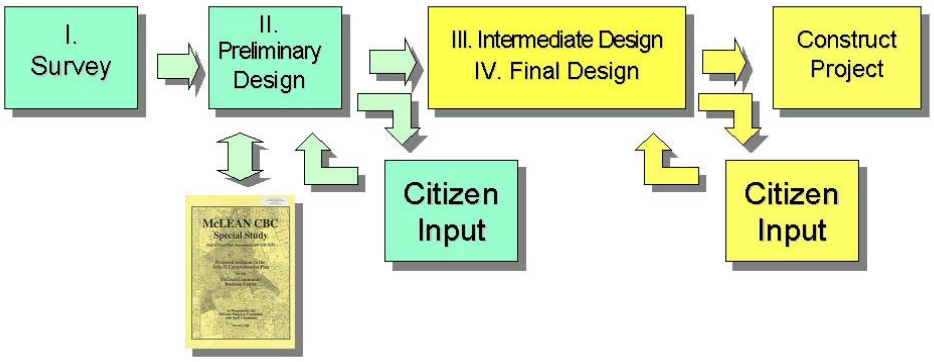


Figure 22. - Chain Bridge Road Streetscape Implementation Process

This describes the process for an individual project area. Complete revitalization of the McLean CBC will require completion of improvements in multiple areas. To date, the MRC has begun to examine additional efforts on Center Street, and other streets within the McLean CBC have been considered for transportation improvements. These could serve as opportunities for streetscape improvements as well:

1. Demonstration Project – Complete design and implementation of a small demonstration project within the Chain Bridge Road project area.
2. Chain Bridge Road Design – Complete design for improvements of Chain Bridge Road, including roundabout, if desired. Determine overall project costs. Divide project into north and south sections if necessary to limit costs of any one construction phase.
3. Center Street - Complete design and construction of the Center Street project.
4. Beverly Road – Design and implement streetscape improvements in conjunction with planned transportation improvements to Beverly Road.

5. Old Dominion Drive – Design and construct streetscape improvements on Old Dominion Drive.
6. Other CBC Locations – Design and construct streetscape improvements on Elm Street and other areas within the McLean CBC.

However, complete implementation of the *Open Space Design Standards* within the CBC project area can only occur with the successful resolution of specific policy initiatives.

Policy Initiatives Required

Review and Acceptance of Roundabout

Construction of a roundabout will require approval of its design by the Virginia Department of Transportation. To date, no comparable project exists in the system of Commonwealth maintained roadways, and Virginia has not yet adopted guidelines for roundabout design or construction. Thus, proponents of this project may face the difficult challenge of trying to get not only this roundabout approved, by roundabouts in general approved. However, VDOT is looking for opportunities to install roundabouts where appropriate.

Representatives from VDOT did attend an early presentation of findings from this study, and their comments may be prescient. They questioned why a roundabout was selected for improved traffic flow, or for traffic calming, when signal modifications or other geometric improvements had not been investigated. It may prove difficult for VDOT to assess the non-transportation aspects of the roundabout which help make it an attractive option. Even under optimal circumstances, design, review and programming a roundabout for funding could take a number of years.

Acceptance of non-Dominion Virginia Power Lighting Fixtures

Inclusion of the non-standard fixtures within the VDOT right of way will require, fundamentally, an agreement for maintenance. The current Fairfax County/Dominion Virginia Power arrangement provides an extremely convenient way for the County to provide roadway and sidewalk lighting. We anticipate that an alternative proposal would have to clarify ownership of the fixtures; include permission to operate them within the right-of-way and possible indemnification of VDOT; and provide for the cost of operation and maintenance. Maintenance can be expected to consist of periodic replacement of bulbs and ballast, and, less frequently, replacement of poles which are damaged.

Negotiate Private Sector Contributions of Right-of-Way

County projects and VDOT projects typically proceed to a certain point in design, when right-of-way acquisition begins. Substantial amounts of new right-of-way must be secured before full implementation of the streetscape program. As described above, the process for obtaining these rights will be complicated by the need to secure inter-parcel access agreements, where access control is desired, and where adjacent parcels can potentially

utilize a single entrance. To effectively meet any construction schedule, MRC will have to have to become actively engaged in identifying affected property owners and beginning the process of convincing them that not only is the project’s success in their best interest, but that their contribution is critical to the success of the project.

6. Summary

Much of what the 1998 *McLean CBC Special Study* proposed has been accomplished, at least in part, in other locations within Fairfax County. No single concept is without precedent elsewhere in the Country. Similar to all revitalization efforts in Fairfax County, however, McLean must contend with both the traditional constraints of capital projects – construction cost, design and approval schedule, utility relocation, right-of-way acquisition - and some unique challenges. Constructing a roundabout to provide both aesthetic and functional advantages has, to our knowledge, yet to be accomplished in Virginia. Second, the desire to utilize a community selected light fixture, and to locate it on public streets, is not currently supported by County policy. Nevertheless, the McLean community benefits from extraordinarily well informed and involved residents, and an established and professionally managed revitalization program. Both will be necessary for success.

On the basis of this study, the recommended *Open Space Design Standards* can be effectively implemented on Chain Bridge Road as a important first major step to improving the overall appearance and livability of McLean. With some modifications, all key elements are viable, constructible and will contribute greatly to the McLean's CBC's sense of place and to the success of its commercial enterprises. Specifically, this study finds the following:

- existing right-of-way and other limitations compromise the number of possible traffic-calming measures than can be effectively used on Chain Bridge Road. However, the proposed textured flush medians, roundabout and paver crosswalks can be expected to slow individual drivers negotiating these features;
- it is possible to locate a roundabout which follows current FHWA guidelines and causes limited disruption to some adjacent properties. This roundabout would improve intersection operations in all but one time period studied. It deserves further detailed analysis and review by VDOT to confirm that it can be constructed as part of the state-maintained highway system;

- the realignment of Laughlin Avenue and construction of a Main Street as described in the *McLean CBC Special Study* will allow for a functioning intersection at Chain Bridge Road;
- the proposed palette of hardscape and landscape materials described will effectively contribute to an improved streetscape, and can be installed within the Chain Bridge Road corridor, subject to the acquisition of necessary land rights;

- overhead utilities should, at a minimum, be consolidated so that only overhead primary power is allowed, with all communications facilities located underground. All perpendicular overhead crossings above Chain Bridge Road should eliminated. Should the roundabout be constructed, removal of all overhead utilities in that area should be a priority;
- McLean should continue to purse the designation and approval of a local standard light fixture for use in all areas of the CBC, including public streets. Current limited choices are based on an agreement between Dominion Virginia Power and Fairfax County to provide lighting at no initial cost, subject to a commitment to a certain length of use and thus income from power sales. Adoption of an alternate policy could make the use of a different standard achievable.

The next steps include the designation of a demonstration project, and continuation of the design process for Chain Bridge Road. Concurrently, Fairfax County and the MRC should work with individual businesses which plan to develop parcels in the CBC area to implement the *Open Space Design Standards*. Parcels on Chain Bridge Road should be encouraged to develop in accordance with the schematic streetscape plans prepared as part of this study.

With continued public and private effort, Chain Bridge Road, and all of the McLean CBC should notice qualitative improvements in their appearance and in the quality of pedestrian and driver experience.

Appendix

1. **Capital Cost Estimates**
2. **Right-of-Way Acquisition**
3. **Turning Movement Counts**

1. Capital Cost Estimates

Estimates were prepared based on the following assumptions.

ROUNDABOUT

The roundabout estimate includes quantities associated with the construction of the roundabout. The roundabout area encompasses Chain Bridge Road from Emerson Ave. to Corner Lane and Old Dominion Drive approximately 300 feet north and south of Chain Bridge Road.

Demolition

Demolition of sidewalk assumes the existing sidewalk has a typical 4’ section. Demolition of the concrete entrances includes the demolition of any curb and gutter necessary to remove the entrance. Demolition of the asphalt includes:

- An 6’ section of asphalt behind each of the concrete entrances that are to be removed;
- Area of the roundabout;
- Areas within existing parking lots that will need to be removed to construct the sidewalk.

Demolition of the CG-6 includes all CG-6 within the limits of the roundabout.

Street

The quantity of 5’ sidewalk includes the section parallel to the street and around the curb return to the point of tangency with the intersecting street. Asphalt to be replaced is located at the roundabout and at the new entrances. The estimate assumes new curb and gutter within the limits of the roundabout and MS-2 median. We assume that handicapped ramps will be placed at every intersection.

Maintenance of Traffic

The maintenance of traffic estimate assumes that:

- traffic signal controls will remain active during the construction process;
- at least one paved lane will remain open in each direction;
- adequate protection will be provided for vehicles, pedestrians, and construction workers;

- moving lanes will be accomplished by using painted lines and concrete traffic barricades.

CHAIN BRIDGE EXCLUDING EMERSON AVENUE TO CORNER LANE

This portion includes quantities associated with the improvements being constructed along Chain Bridge Road excluding those associated with the roundabout.

Demolition

Demolition of sidewalk assumes the existing sidewalk has a typical 4′ section. Demolition of the concrete entrances includes the quantity of concrete to remove the entrances. All entrances are assumed to be removed and replaced with modified entrances that will include pavers. Demolition of the asphalt includes:

- 6′ section of asphalt behind each of the concrete entrances that are to be removed;
- 10′ section of asphalt that will allow the construction of the textured median;
- areas within existing parking lots that will need to be removed to build the sidewalk.

Milling of asphalt assumes an average edge of pavement to edge of pavement width of 57′ minus the 10′ median that will already be demolished. A milling depth of 1.5″ was assumed. CG-6 demolition includes the CG-6 that will be removed between the intersections and entrances.

Street

The quantity of 5′ sidewalk includes the section parallel to the street and around the curb return to the point of tangency with the intersecting street. Full depth asphalt pavement will be needed at the new entrances. Estimates assume superpave asphalt will be overlaid 1.5″ thick where asphalt was milled. CG-6 with a 2′ gutter pan will replace the demolished CG-6 and will be needed where existing entrances are being removed. CG-9 entrances are used at all residential entrances. All entrances are assumed to be replaced with a modified entrance that will include pavers. CG-11 entrances are used at all commercial entrances. All entrances are assumed to be replaced with modified entrances that will include brick pavers. It is assumed that handicapped ramps will be placed at all intersections. The textured median is assumed to be 10′ wide.

The intersections assumed for upgraded signals are:

- Tennyson Drive and Chain Bridge Rd.
- Laughlin Avenue and Chain Bridge Rd. (Chicken Out Rotisserie)

Upgrade is limited to replacement of the poles, mast arms, and associated wiring. Pavement markings include:

- Crosswalks
- Lane lines

ESTIMATES

ITEM #	DESCRIPTION	QTY	UNIT	UNIT COST	COST
A	**ROUNDABOUT**				
1	**DEMOLITION**				
	4' Sidewalk	980	LF	$4.00	$3,920.00
	Concrete Entrances	246	SY	$17.00	$4,182.00
	Asphalt	5,850	SY	$9.00	$52,650.00
	CG-6	1,200	LF	$4.00	$4,800.00
2	**STREET**				
	Asphalt	4,685	SY	$40.37	$189,133.45
	CG-6	1,330	LF	$12.00	$15,960.00
	MS-2 Median	610	LF	$25.00	$15,250.00
	CG-12	15	EA	$350.00	$5,250.00
3	**STREETSCAPE**				
	5' Sidewalk	1,230	LF	$50.00	$61,500.00
	Pavers at outside edge of roundabout	1,250	SF	$8.00	$10,000.00
	Crosswalks	3,300	SF	$20.00	$66,000.00
	Light Fixtures	12	EA	$3,000.00	$36,000.00
	Benches	3	EA	$1,000.00	$3,000.00
	Trash Receptacles	6	EA	$500.00	$3,000.00
	Railings, bollards	380	LF	$75.00	$28,500.00
	Trees	29	EA	$1,000.00	$29,000.00
	Shrub/planting beds	7,000	SF	$10.00	$70,000.00
4	**UTILITY RELOCATION**				
	Onderground all utilities, allow	600	LF	$1,000.00	$600,000.00
5	**MAINTENANCE OF TRAFFIC**				
	Maintanence of Traffic	1	LS	$400,000.00	$400,000.00
	SUM OF 'A' ITEMS				$1,598,145.45
	MOBILIZATION (5%):				$79,907.27
	ENGINEERING & CONTINGENCIES (20%):				$335,610.54
	TOTAL:				**$2,013,663.27**

ITEM #	DESCRIPTION	QTY	UNIT	UNIT COST	COST
B	**CHAIN BRIDGE ROAD EXCLUDING EMERSON AVENUE TO CORNER LANE**				
1	**DEMOLITION**				
	4' Sidewalk	5,100	LF	$4.00	$20,400.00
	Concrete Entrances	1,400	SY	$17.00	$23,800.00
	Demolish Asphalt	5,400	SY	$9.00	$48,600.00
	Mill Asphalt (1.5")	17,860	SY	$4.00	$71,440.00
	CG-6	5,100	LF	$4.00	$20,400.00
2	**STREET**				
	Asphalt Section (base, subbase, surface)	610	SY	$40.37	$24,625.70
	Asphalt Overlay (1.5" Superpave)	17,860	SY	$5.85	$104,481.00
	CG-6	5,300	LF	$12.00	$63,600.00
	CG-9 (Modified - includes pavers)	200	SY	$60.00	$12,000.00
	CG-11 (Modified)	19	EA	$4,000.00	$76,000.00
	CG-12	56	EA	$350.00	$19,600.00
	Textured Median	3,800	SY	$135.00	$513,000.00
	Upgrade Signalized Intersections	2	EA	$60,000.00	$120,000.00
	Pavement Markings	1	LS	$10,000.00	$10,000.00
3	**STREETSCAPE**				
	5' Sidewalk	5,300	LF	$50.00	$265,000.00
	Crosswalks	14,000	SF	$20.00	$280,000.00
	Light Fixtures	52	EA	$3,000.00	$156,000.00
	Bus Shelters	3	EA	$25,000.00	$75,000.00
	Benches	17	EA	$1,000.00	$17,000.00
	Trash Receptacles	13	EA	$500.00	$6,500.00
	Trees	80	EA	$1,000.00	$80,000.00
	Shrub/planting beds	10,000	SF	$10.00	$100,000.00
4	**UTILITY RELOCATION**				
	Consolidation & partial undergrounding, allow	3,650	LF	$300.00	$1,095,000.00
5	**MAINTENANCE OF TRAFFIC**				
	Maintanence of Traffic	1	LS	$300,000.00	$300,000.00
	SUM OF 'B' ITEMS				$3,502,446.70
	MOBILIZATION (5%):				$175,122.34
	ENGINEERING & CONTINGENCIES (20%):				$735,513.81
	TOTAL:				**$4,413,082.84**

2. Right-of-Way Acquisition

Notes:

1. Right-of-way takings are based on preliminary horizontal alignment and are thus subject to change.
2. Width of right-of-way taking is based on current best estimates of impacts. No vertical design has been completed. This may affect final locations.
3. The proposed right-of-way is typically assumed to be located 3 feet beyond the back of sidewalk.
4. Additional right-of-way and/or easements may be needed for construction, grading, utilities or other special conditions.
5. All abutters are listed. Those with no proposed takings at present show “0” under “Total Fee Taking”.

OWNER NO.	ABUTTING LANDOWNER	TOTAL FEE TAKING (SF)
1	STONELEIGH ASSOCIATION	0.00
2	CHURCH OF THE LUTHERAN EVANGELICAL	2,813.52
3	RICHARD A ROGERS ET AL	823.11
4	BERNARD J YOUNG ET AL	1,001.98
5	CLARKE HOOK CORPORATION	218.58
6	ESTER L COOPERSMITH	0.00
7	McLEAN CP ACQ LLC	0.00
8	THOMAS J LANTZ SR TR	0.00
9	HELEN KONTZIAS	1,284.40
10	GEORGE Z KONTZIAS	540.18
11	FIRESTONE REAL ESTATE	590.65
12	THE AMERICAN OIL COMPANY	325.88
13	THE AMERICAN OIL COMPANY	1,490.30
14	EXXON CORP	0.00
15	EXXON CORP	1,546.03
16	SUN OIL CO	467.31
17	ANNIE L REYNOLDS TR	304.50
18	EAST HARBOR LLC	1,155.83
19	FRANCES Z JUSTICE	376.16
20	369 CHAIN BRIDGE ROAD LLC	0.00
21	McLEAN BAPTIST CHURCH	961.88
22	ZHG LP	0.00
23	ROCCOS OF VIRGINIA INC	0.00
24	ROCCOS OF VIRGINIA INC	0.00
25	ROCCOS OF VIRGINIA INC	0.00
26	ROCCOS OF VIRGINIA INC	0.00
27	FRANK ZAFREN AND ALEC JACOBSON TRS	0.00
28	K T ASSOCIATES	0.00
29	K T ASSOCIATES	0.00
30	GEORGE VROUSTOURIS	0.00

OWNER NO.	ABUTTING LANDOWNER	TOTAL FEE TAKING (SF)
31	HILDA M AND EDWARD O BLUE	240.68
32	HILDA M AND EDWARD O BLUE	125.25
33	VIRGINIA ELECTRIC AND POWER COMPANY	200.50
34	GENEVIEVE RESPASS AND DAVID O MARSHALL	325.74
35	SUSHMA RAJAN TR	250.50
36	CURT HANSON	0.00
37	LARS E HANSON AND ELIZABETH G HANSON	375.75
38	JAMES McGOVERN AND PATRICIA McGOVERN	309.54
39	LEE H SUNG ET UX AND MOON K SUNG ET UX	0.00
40	GEORGE R HERRMAN TR	501.00
41	GEORGE R HERRMAN TR	288.42
42	CEDAR CLUSTER HOA INC.	667.01
42A	PATRICIA A MOORE	249.43
43	JOAN ESPOSITO TR AND ESPOSITO FAMILY TRUST	424.89
44	KEVIN P TIGHE TR	0.00
45	McLEAN SHOPPING CENTER	0.00
46	FAIRFAX COUNTY BOARD OF SUPERVISORS	468.33
47 & 48	PGA LLC	746.46
49	PGA LLC	324.95
50	PGA LLC	0.00
51	McLEAN CBD LIMITED	463.78
52	DALYA CLEARWATER INC.	840.86
53	FEREYDOUN NIKZAD ET AL	496.35
54	McDONALDS CORP	158.52
55	JOON HAM ET AL	747.56
56	BAHA O KIKHIA	798.22
57	FAY BOYLE	3,343.54
58	OLD MCLEAN VILLAGE UNIT OWNERS ASSOCIATION	155.70
59	T I FINANCE AND INVESTMENT LLC	0.00
60	JOHN N SEXTON	0.00
61	JOHN N SEXTON	0.00
62	THIRTEEN TWENTY OLD CHAIN	0.00
63	PNS ASSOCIATES McLEAN	0.00
64	SCOTT BOROCZI TR	0.00
65	T I FINANCE AND INVESTMENT LLC	0.00
66	DOMINION ENTERPRISE LC	0.00
67	6820 ELM STREET LLC	0.00
68	SPANOS ERMIONE	0.00
69	KOENIG PARTNERS	0.00
70	MCCAR WALSH LC	0.00
71	LITTLE BOY BLUE PLUMBING AND HEATING	0.00
72	JOSEPH C AND JOYCE A BLUE	0.00
73	McDONALDS CORP	0.00
74	ENERGY OIL COMPANY INC	0.00
75	ROGER AND NANCY GREENWALD; EMERSON AVENUE LLC	0.00
76	MOLY ANNE VICK	0.00
77	CLAIRE T MEGILL TRS.	0.00
78	ANTONIO I IANNARELLI	0.00
79	BENCHMARK ASSOCIATES	0.00
TOTAL		**26,403.29**

3. Turning Movement Counts